bürkert
FLUID CONTROL SYSTEMS

Type 8228
ELEMENT

Inductive conductivity meter
Induktives Leitfähigkeits-Messgerät
Conductimètre inductif

Operating Instructions
Bedienungsanleitung
Manuel d'utilisation

MAN 1000220442 EN Version: A Status: RL (released | freigegeben) printed: 19.01.2015

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We reserve the right to make technical changes without notice.
Technische Änderungen vorbehalten.
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Operating Instructions 1411/1_EU-ML 00565588 Original_FR

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1 ABOUT THIS MANUAL

This manual describes the entire life cycle of the device. Please keep this manual in a safe place, accessible to all users and any new owners.

This manual contains important safety information.

Failure to comply with these instructions can lead to hazardous situations.

▸ This manual must be read and understood.

1.1 Symbols used

DANGER

Warns against an imminent danger.

▸ Failure to observe this warning can result in death or in serious injury.

WARNING

Warns against a potentially dangerous situation.

▸ Failure to observe this warning can result in serious injury or even death.

CAUTION

Warns against a possible risk.

▸ Failure to observe this warning can result in substantial or minor injuries.

NOTE

Warns against material damage.

▸ Failure to observe this warning may result in damage to the device or system.

Indicates additional information, advice or important recommendations.

Refers to information contained in this manual or in other documents.

→ Indicates a procedure to be carried out.

1.2 Definition of the word "device"

The word "device" used within this manual refers to the conductivity meter type 8228.

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2 INTENDED USE

Use of the device that does not comply with the instructions could present risks to people, nearby installations and the environment.

- The 8228 conductivity meter is intended solely for the measurement of the conductivity.
- This device must be protected against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of climatic conditions.
- This device must be used in compliance with the characteristics and commissioning and use conditions specified in the contractual documents and in the user manual.
- Requirements for the safe and proper operation of the device are proper transport, storage and installation, as well as careful operation and maintenance.
- Only use the device as intended.

- Observe any existing restraints when the device is exported.

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3 BASIC SAFETY INFORMATION

This safety information does not take into account:

- any contingencies or occurences that may arise during installation, use and maintenance of the devices.
- the local safety regulations for which the operating company is responsible including the staff in charge of installation and maintenance.

Danger due to electrical voltage.

- ▸ Shut down the electrical power source of all the conductors and isolate it before carrying out work on the system.
- ▸ All equipment connected to the 8619 shall be double insulated with respect to the mains according to the standard IEC 61010-1:2010.
- ▸ Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high pressure in the installation.

- ▸ Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Risk of injury due to high fluid temperatures.

- ▸ Use safety gloves to handle the device.
- ▸ Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- ▸ Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

Various dangerous situations

To avoid injury take care to:

- ▸ not to use the device in explosive atmospheres.
- ▸ not to use the device in an environment incompatible with the materials it is made of.
- ▸ not to use the device for the measurement of the conductivity of gases.
- ▸ not to subject the device to mechanical loads (e.g. by placing objects on top of it or by using it as a step).
- ▸ not to make any external or internal modifications to the device.
- ▸ to prevent any unintentional power supply switch-on.
- ▸ to ensure that installation and maintenance work are carried out by qualified, authorised personnel in possession of the appropriate tools.
- ▸ to guarantee a defined or controlled restarting of the process, after a power supply interruption.
- ▸ to use the device only if in perfect working order and in compliance with the instructions provided in the operating instructions.
- ▸ to observe the general technical rules when installing and using the device.

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NOTE

The device may be damaged by the fluid in contact with.

- Systematically check the chemical compatibility of the component materials of the device and the fluids likely to come into contact with it (for example: alcohols, strong or concentrated acids, aldehydes, alkaline compounds, esters, aliphatic compounds, ketones, halogenated aromatics or hydrocarbons, oxidants and chlorinated agents).

NOTE

Elements / Components sensitive to electrostatic discharges

- This device contains electronic components sensitive to electrostatic discharges. They may be damaged if they are touched by an electrostatically charged person or object. In the worst case scenario, these components are instantly destroyed or go out of order as soon as they are activated.
- To minimise or even avoid all damage due to an electrostatic discharge, take all the precautions described in the EN 61340-5-1 norm.
- Do not touch any of the live electrical components.

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4 GENERAL INFORMATION

4.1 Manufacturer's address and international contacts

To contact the manufacturer of the device, use following address:

Bürkert SAS

Rue du Giessen

BP 21

F-67220 TRIEMBACH-AU-VAL

You may also contact your local Bürkert sales office.

The addresses of our international sales offices are available on the internet at:

www.burkert.com

4.2 Warranty conditions

The condition governing the legal warranty is the conforming use of the device in observance of the operating conditions specified in this manual.

4.3 Information on the Internet

You can find the user manuals and technical data sheets regarding the type 8228 at:

www.burkert.com

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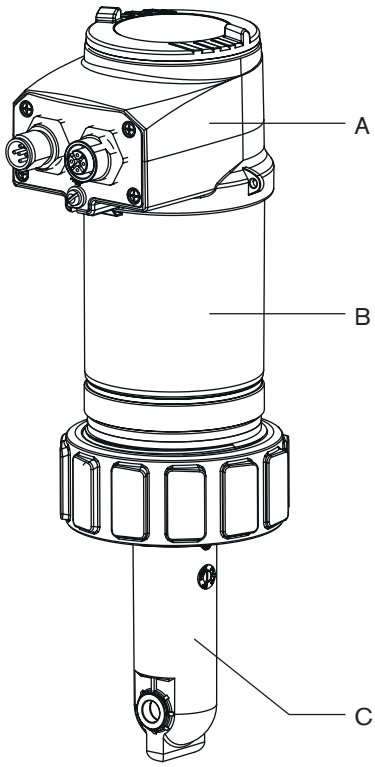
5 DESCRIPTION

5.1 Area of application

The device is intended to measure the conductivity. Thanks to one or two fully adjustable transistor outputs, the device can be used to switch a solenoid valve, activate an alarm and, thanks to one or two 4-20-mA current outputs, establish one or two control loops.

5.2 Knowing the device

The device comprises:



A: an electrical connection housing, with a screw-on cover.

A display module with navigation button, used to read and/or configure the parameters of the device, is delivered with some versions of the device. The display module is to be mounted in the electrical connection housing.

The display module is available as an accessory. See chap. 11.

B: An electronic module for the acquisition / conversion of the measurable variables:

- acquisition of the conductivity in µS/cm,
- acquisition of the temperature,
- calculation of the conductivity at a temperature of 25 °C,
- conversion of the conductivity into a resistivity at 25 °C in Ohm/cm.

C: a conductivity sensor comprised of:

- a pair of magnetic coils,
- a sensor holder in PP, PVDF or PEEK equipped with an integrated temperature probe.

The conductivity sensor is pined together with the electronic module and cannot be dismantled.

The conductivity sensor comprises a temperature probe to compensate the temperature when measuring the conductivity.

The device operates on a 3 wire system and needs a 12-36 V DC power supply.

The electrical connection is made, depending on the version, via a 5 pin, male, M12 fixed connector or via a 5 pin, male, M12 fixed connector and a a 5 pin, female, M12 fixed connector.

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5.3 Knowing the available versions

The following versions of the device are available. Each version is available without or with the display module.

Supply voltage	Outputs	Electrical connection	Materials		UL [2]	Order code	
			Conductivity sensor holder	Seal of the conductivity sensor		without display module	with display module
12-36 V DC	1 x transistor, NPN/PNP, + 1 x 4-20 mA	Male 5-pin M12 fixed connector	PP	FKM [1]	no	565601	566601
			PVDF	FKM [1]		565603	566603
			PEEK	FKM [1]		565605	566605
			PP	FKM [1]	yes	565611	566611
			PVDF	FKM [1]		565613	566613
			PEEK	FKM [1]		565615	566615
12-36 V DC	2 x transistor, NPN/PNP, + 2 x 4-20 mA	Male 5-pin M12 fixed connector + female 5-pin M12 fixed connector	PP	FKM [1]	no	565602	566602
			PVDF	FKM [1]		565604	566604
			PEEK	FKM [1]		565606	566606
			PP	FKM [1]	yes	565612	566612
			PVDF	FKM [1]		565614	566614
			PEEK	FKM [1]		565616	566616

[1] Seal delivered with the device.

[2] identified by the logo c UL us on the name plate of the device.

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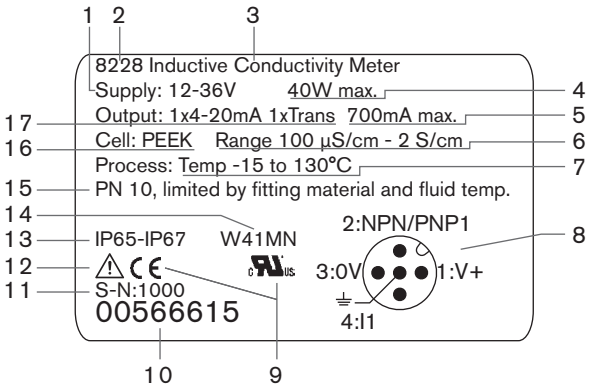
5.4 Understanding the name plate



1. Supply voltage
2. Type of the device
3. Measurable variable
4. Max. power consumption
5. Max. current available at the transistor output(s)
6. Conductivity measuring range
7. Fluid temperature range
8. Pin assignment of the M12 fixed connector(s)
9. Conformity logos
10. Order code
11. Serial number
12. Warning: Before using the device, take into account the technical specifications described in these operating instructions.
13. Protection class
14. Construction code
15. Nominal pressure of the fluid
16. Material of the conductivity sensor holder
17. Available outputs

Fig. 1: Name plate of the device (example)

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6 TECHNICAL DATA

6.1 Operating conditions

Ambient temperature	-10 to +60 °C
Air humidity	< 85 %, non condensated
Height above sea level	max. 2000 m
Installation category acc. to UL 61010-1	Category I
Degree of pollution acc. to EN 61010-1	Degree 2
Protection class acc. to EN 60529	IP65 and IP67 with connectors plugged in and tightened and electronic module cover fully screwed down

6.2 Conformity to standards and directives

The device conforms to the EC directives through the following standards:

- EMC: EN 61000-6-2, EN 61000-6-3 and Annex1, EN 61326-1-4 (Table 2, Immunity for industrial environment)
- Environnemental testing: Vibration: EN 60068-2-6, Shock: EN 60068-2-27.
- Pressure: conforms to the requirements of the article 3§3 of the pressure directive 97/23/CE.

Acc. to the 97/23/CE pressure directive, the device can only be used in the following cases (depending on the max. pressure, the pipe diameter and the kind of fluid):

Type of fluid	Conditions
Fluid group 1, par. 1.3.a	Forbidden
Fluid group 2 par. 1.3.a	DN ≤ 32 or DN > 32 and PNxDN ≤ 1000
Fluid group 1 par. 1.3.b	PNxDN ≤ 2000
Fluid group 2 par. 1.3.b	DN ≤ 200 or PN ≤ 10

The UL devices with variable key PE72 comply with the following standards:

- UL 61010-1
- CRN/CSA-C22.2 n° 61010-1.

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6.3 General technical data

Pipe diameter	DN15 to DN400
Type of fitting	S020
Fluid temperature ▪ 8228 with conductivity sensor in PVDF ▪ 8228 with conductivity sensor in PP ▪ 8228 with conductivity sensor in PEEK	The fluid temperature may be restricted by the fluid pressure, the material the conductivity sensor holder is made of and the material the S020 fitting used is made of. See "Fig. 2"". ▪ -15 °C to +100 °C ▪ 0 °C to +80 °C ▪ -15 °C to +130 °C
Fluid pressure ▪ 8228 with conductivity sensor in PVDF ▪ 8228 with conductivity sensor in PP ▪ 8228 with conductivity sensor in PEEK	The fluid pressure may be restricted by the fluid temperature, the material the conductivity sensor holder is made of and the material the S020 fitting used is made of. See "Fig. 2"". ▪ PN6 ▪ PN6 ▪ PN10
Conductivity measurement ▪ Measurement range ▪ Resolution ▪ Measurement deviation ("measurement bias" as defined in the standard JCGM 200:2012) ▪ Linearity ▪ Repeatability ▪ Response time (90%)	 ▪ 100µS/cm to 2 S/cm. ▪ 0,1 µS/cm ▪ ±(2% of the measured value + 5µS/cm) ▪ ±2% ▪ ±(0,2% of the measured value + 2µS/cm) ▪ from 3 s (without filter) to 40 s (with "slow" filter)
Temperature measurement ▪ Measurement range ▪ Resolution ▪ Measuring uncertainty ▪ Response time (90%)	 ▪ -40 °C to +150 °C, restricted by the conductivity sensor used ▪ 0.1 °C ▪ ±1 °C ▪ < 280 s (without filter)
Temperature compensation	▪ none ▪ according to a predefined curve (NaCl, NaOH, HNO_3 or H_2SO_4) or ▪ or according to a curve defined especially for your process

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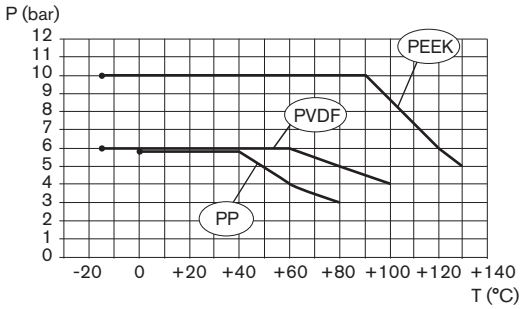

Fig. 2: Fluid temperature - pressure dependency for a 8228 with a conductivity sensor in PVDF or a conductivity sensor in PP or a conductivity sensor in PEEK, with a fitting S020 in stainless steel

6.4 Mechanical data

Part	Material
Box / seals	stainless steel 316L 1.4404, PPS / EPDM
Cover / seal	PC / EPDM
Display module	PC / PBT
M12 fixed connector	nickel-plated brass
Fixed connector holder	stainless steel 316L
Screws	stainless steel
Nut	PC
Conductivity sensor holder / seal	▪ PVDF / FKM (in contact with the fluid) ▪ PP / FKM (in contact with the fluid) ▪ PEEK / FKM (in contact with the fluid)

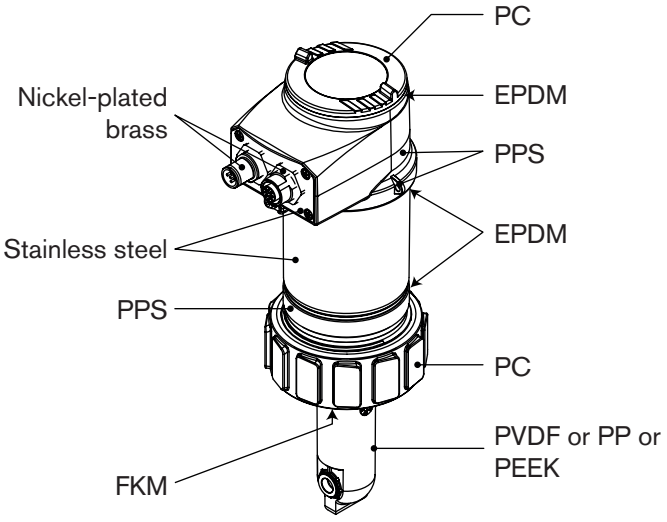

Fig. 3: Materials of the device

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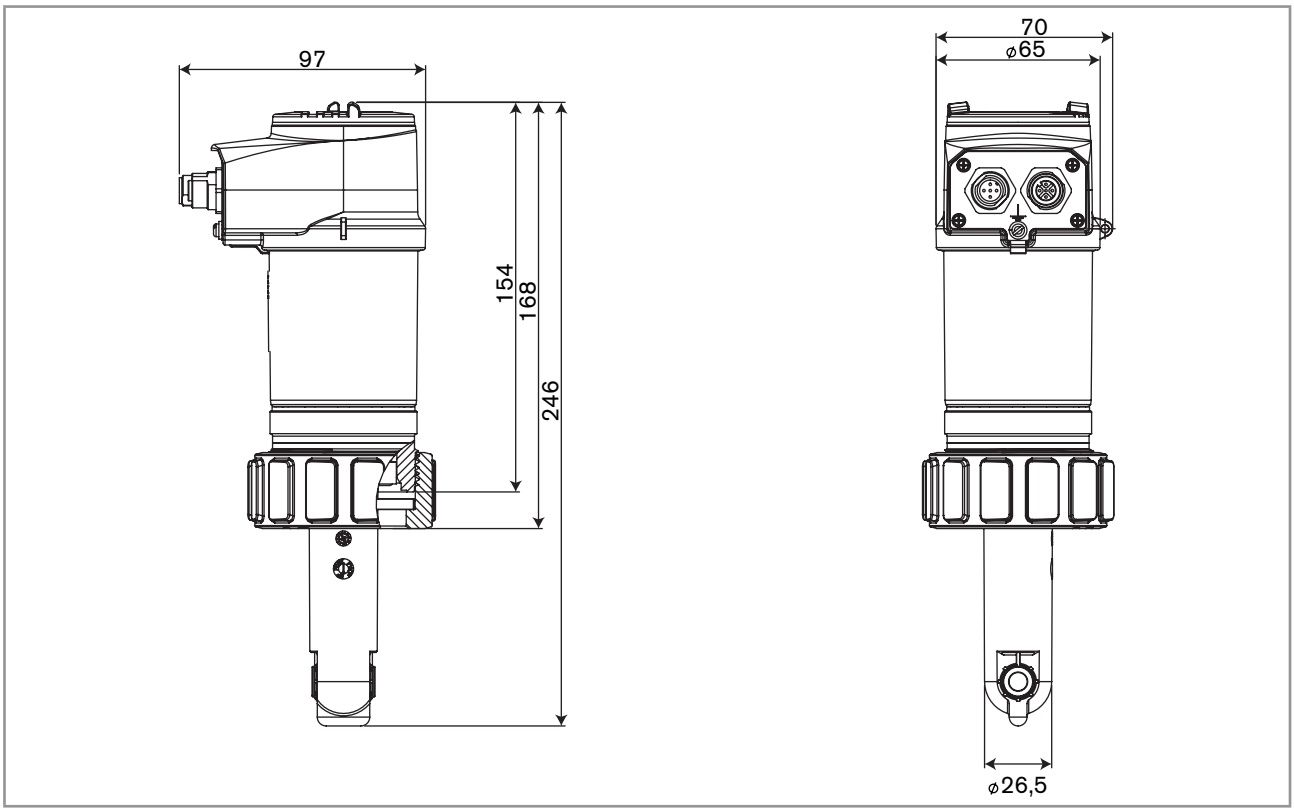
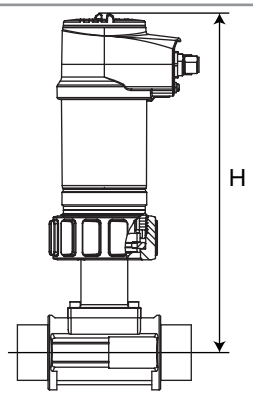


Fig. 4: Dimensions of the device [mm]

	 T-fitting	 Spigot, in plastic	 Welding tab with radius, in stainless steel
DN15 [1]	233	-	-
DN20 [1]	233	-	-
DN25 [1]	233	-	-
DN32	233	-	-
DN40	237	-	-
DN50	243	-	238
DN65	243	264 [1]	244
DN80	-	264 [1]	249
DN100	-	264	259
DN110	-	-	-
DN125	-	299	270

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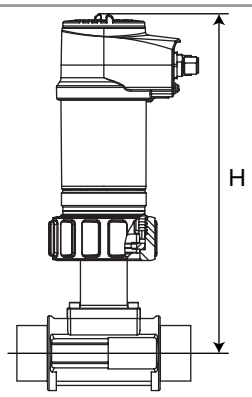	 T-fitting	 Spigot, in plastic	 Welding tab with radius, in stainless steel
DN150	-	306	281
DN180	-	-	-
DN200	-	327	302
DN250	-	345	362
DN300	-	357	381
DN350	-	370	393
DN400	-	385	-

Fig. 5: Dimensions of the conductivity meter 8228 combined with a fitting S020 [Height H in mm]

[1] Only analysis specific fittings.

6.5 Electrical data

Power supply 12-36 V DC	▪ filtered and regulated ▪ SELV circuit, with a safe energy level ▪ oscillation rate: ±10 %
Power source (not supplied)	▪ limited power source according to paragraph 9.3 of EN 61010-1 standard ▪ or class 2 source according to UL 1310/1585 and EN 60950-1 standards
Current consumption ▪ without the consumption of the current outputs and the transistor outputs ▪ with the consumption of the current outputs and the transistor outputs	 ▪ max. 1 W (max. 25 mA at 12 V DC; starting current ~100 mA) ▪ max. 40 W (max. 1 A for the transistor outputs)

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Transistor output	polarized
▪ type	▪ NPN (/sink) or PNP(/source) (through wiring and through parameterizing)
▪ NPN output	▪ 1-36 V DC, 700 mA max. (or 500 mA max. if 2 transistor outputs are wired)
▪ PNP output	▪ supply voltage, 700 mA max. (or 500 mA max. if 2 transistor outputs are wired)
▪ protection	▪ galvanically insulated, protected against overvoltages, polarity reversals and short-circuits
Current output	
▪ specification	▪ 4-20 mA, sink or source (through wiring and through parametrizing), 22 mA to indicate a fault (can be parametered)
▪ uncertainty of the output value	▪ 1% of the full scale
▪ type of connection	▪ 3-wire
▪ max. loop impedance	▪ 1100 Ω at 36 V DC, 610 Ω at 24 V DC, 100 Ω at 12 V DC
▪ Response time (10 % - 90 %)	▪ 150 ms (default value)

6.6 Data of the connectors and wires

Number of fixed connectors	Type of connector
1 male M12 fixed connector	5-pin M12 female connector (not supplied). For the female M12 connector with order code 917116, use a shielded cable: ▪ diameter: 3 to 6.5 mm ▪ wire cross section: max. 0.75 mm^2
1 male M12 fixed connector and 1 female M12 fixed connector	5-pin M12 female connector (not supplied) and 5-pin M12 male connector (not supplied). For the female M12 connector with order code 917116 and the male M12 connector with order code 560946, use a shielded cable: ▪ diameter: 3 to 6.5 mm ▪ wire cross section: max. 0.75 mm^2

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7 ASSEMBLY

7.1 Safety instructions

WARNING

Risk of injury due to non-conforming assembly.

- The device must only be assembled by qualified and skilled staff with the appropriate tools.

Risk of injury due to unintentional switch on of power supply or uncontrolled restarting of the installation.

- Protect the installation against unintentional power-up.
- Guarantee a set or controlled restarting of the process subsequent to any intervention on the device.

7.2 Unscrewing the cover

NOTE

The tightness of the device is not guaranteed when the cover is removed.

- Prevent the projection of liquid inside the housing.

The device may be damaged if a metal component comes into contact with the electronics.

- Prevent contact of the electronics with a metal component (screwdriver, for example).

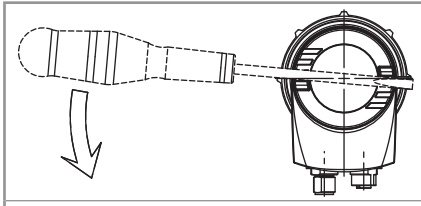	→ To unscrew the cover, use your hand or a tool which can be used as a lever, taking care not to scratch the glass.
	→ Turn the cover until fully unscrewed.

Fig. 6: Unscrewing the cover

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7.3 Mounting the cover

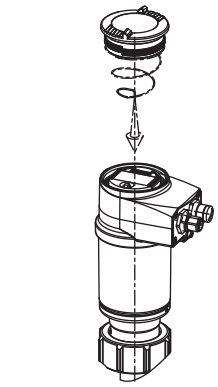
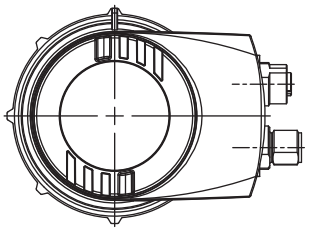
	→ Check that there is a seal on the cover and that it is not damaged. Replace it if necessary. → Grease the seal if necessary, using a component compatible with the seal material.
	→ Fully tighten by hand to guarantee tightness.

Fig. 7: Mounting the cover

7.4 Mounting the display module

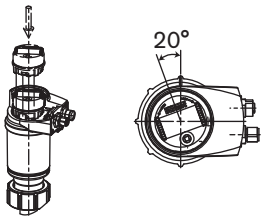
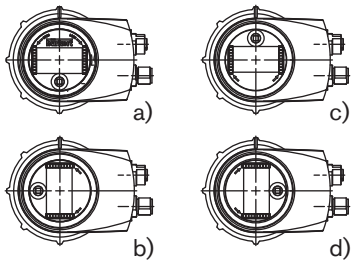
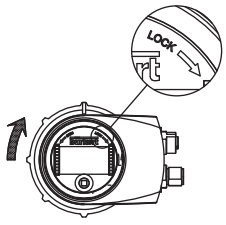
	→ Unscrew the cover (see chap. "7.2"). → Set the display module at an angle of ca. 20° in relation to the desired position.
	→ The display module can be fitted in 4 different positions, at 90° intervals.
	→ Fully push in the display module and turn to the right to lock it.

Fig. 8: Mounting the display module

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7.5 Dismounting the display module

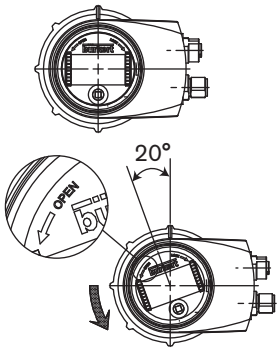
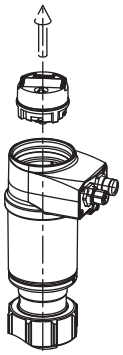
	→ Unscrew the cover (see chap. "7.2"). → Turn the display module by ca. 20° to the left. Once unlocked, the display module is raised slightly by the spring action.
	→ Remove the display module from its housing.

Fig. 9: Dismounting the display module

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8 INSTALLATION AND WIRING

8.1 Safety instructions

Danger due to electrical voltage.

- Shut down the electrical power source of all the conductors and isolate it before carrying out work on the system.
- All equipment connected to the 8619 shall be double insulated with respect to the mains according to the standard IEC 61010-1:2010.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Risk of injury due to high fluid temperatures.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

WARNING

Risk of injury due to non-conforming installation.

- The electrical installation can only be carried out by qualified and skilled staff with the appropriate tools.
- The electrical and fluid installation can only be carried out by qualified and skilled staff with the appropriate tools.
- Install appropriate safety devices (correctly rated fuse and/or circuit-breaker).
- Observe mounting instructions of the fitting.

Risk of injury due to unintentional switch on of power supply or uncontrolled restarting of the installation.

- Protect the installation against unintentional power-up.
- Guarantee a set or controlled restarting of the process subsequent to any intervention on the device.

WARNING

Risk of injury if the fluid pressure/temperature dependency is not respected.

- Observe the fluid temperature-pressure dependency according to the material of the conductivity sensor holder (see the technical data of the device) and according to the materials the fitting is made of (see the operating instructions of the fitting used).
- Observe the Pressure Directive 97/23/CE.

Protect this device against electromagnetic interference, ultraviolet rays and, when installed outdoors, the effects of the climatic conditions.

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8.2 Installing the device in the pipe

The device is put into a fitting S020 mounted on the pipe.

→ Mount the fitting on the pipe obeying the instructions of the operating instructions of the fitting used.

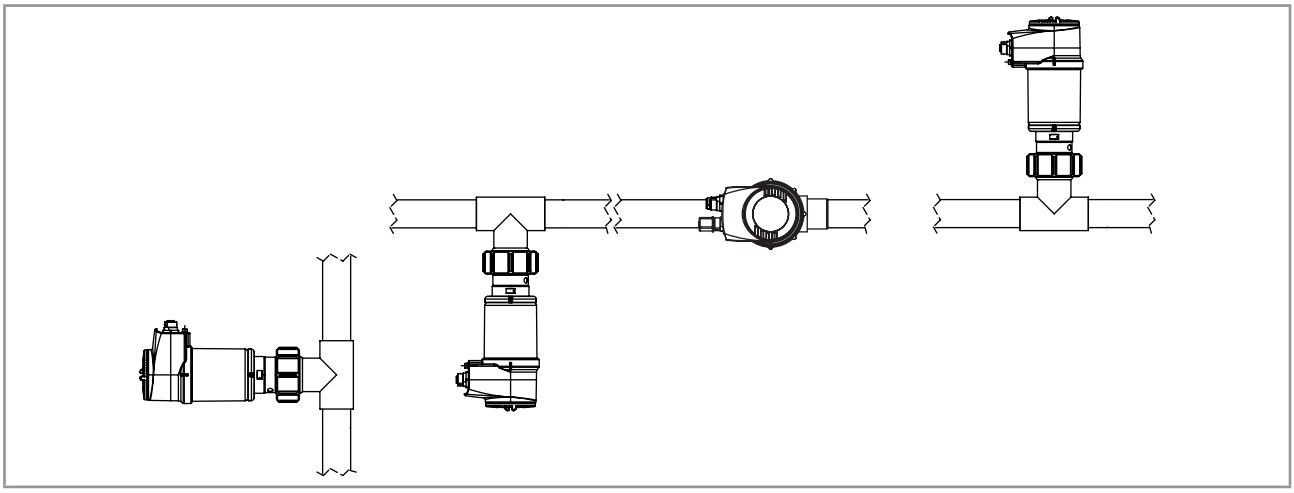

Fig. 10: Positions for the mounting on the pipe

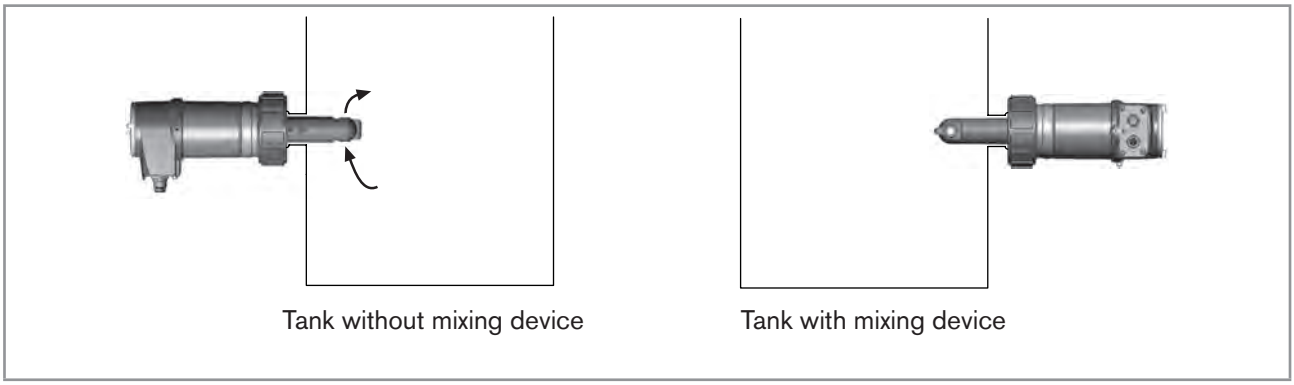

Fig. 11: Positions for the mounting on a container

→ Fit the display module (see chap. "7.4") to calibrate the conductivity sensor and to parameter the device.

→ Calibrate the conductivity sensor (see chap. "9.12.4").

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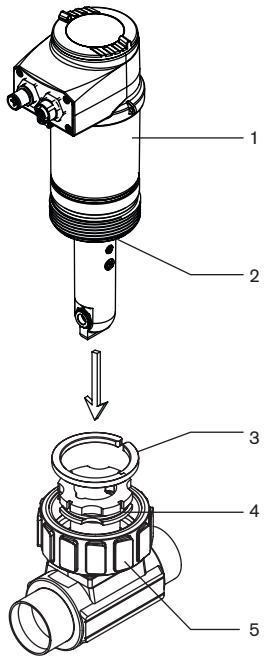
→ Put the device into the fitting, as shown in "Fig. 12":



→ Make sure the seal (mark 2) is on the conductivity sensor.

→ Make sure the material of the seal is compatible with the fluid to be measured.

→ Put the nut (mark 5) on the fitting.

→ Put the snap ring (mark 3) into the groove (mark 4).

→ Engage the device (mark 1) into the fitting.

→ Screw the nut (mark 5) manually on the device.

Fig. 12: Installation of the device into the S020 fitting

→ Wire acc. to instructions in chap. "8.3".

8.3 Wiring the device

DANGER

Risk of injury due to electrical voltage.

- Shut down the electrical power source of all the conductors and isolate it before carrying out work on the system.
- All equipment connected to the 8619 shall be double insulated with respect to the mains according to the standard IEC 61010-1:2010.
- Observe all applicable accident protection and safety regulations for electrical equipment.

- Use a filtered and regulated 12-36 V DC power supply.
- Make sure the installation is equipotential. See chap. "8.3.2".
- Use shielded cables with a temperature limit of 80 °C minimum.
- Do not install theconnection cables near high voltage or high frequency cables; If this cannot be avoided, observe a min. distance of 30 cm.
- Protect the power supply of the device with a 100 mA time-delay fuse and a switch.
- Protect the power supply of each transistor output with a 750 mA fuse.

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8.3.1 Assembling the male or female connector (see chap. "11 Accessories")

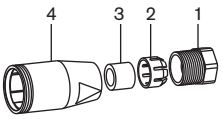
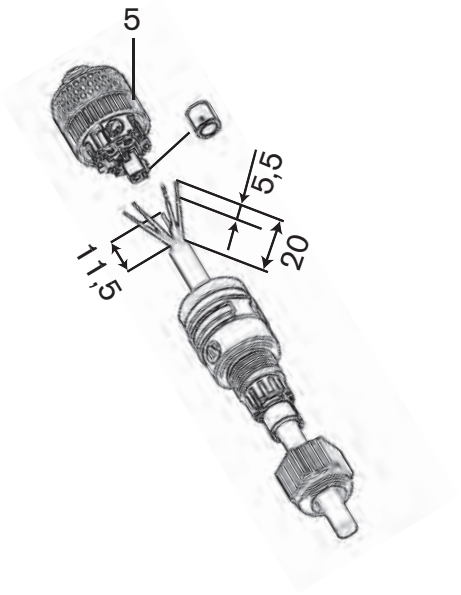
	→ Unscrew the nut [1] on the body [4]. → Insert the cable into the nut [1], the cable clamp [2] and the seal [3], and then into the body [4].
	→ Strip 20 mm of the cable. → Cut the central wire (earth) so that its length is equal to 11.5 mm. → Expose 5.5 mm of the wires on the stripped cable. → Put each wire into the appropriate terminal of the terminal block [5] (see chap. 8.3.3 or 8.3.4). → Tighten the terminal block [5] wired to the body [4]. → Tighten the connector nut [1].

Fig. 13: Assembling the M12 multi-pin connector (not provided)

8.3.2 Making the installation equipotential

To ensure the equipotentiality of the installation (power supply - device - medium):

→ Connect together the various earth spots in the installation to eliminate the potential differences that may occur between different earthes.

→ Observe faultless earthing of the shield of the power supply cable, at both ends.

→ If the device is installed on plastic pipes, earth together the metallic instruments such as pumps or valves, that are as close as possible to the device.

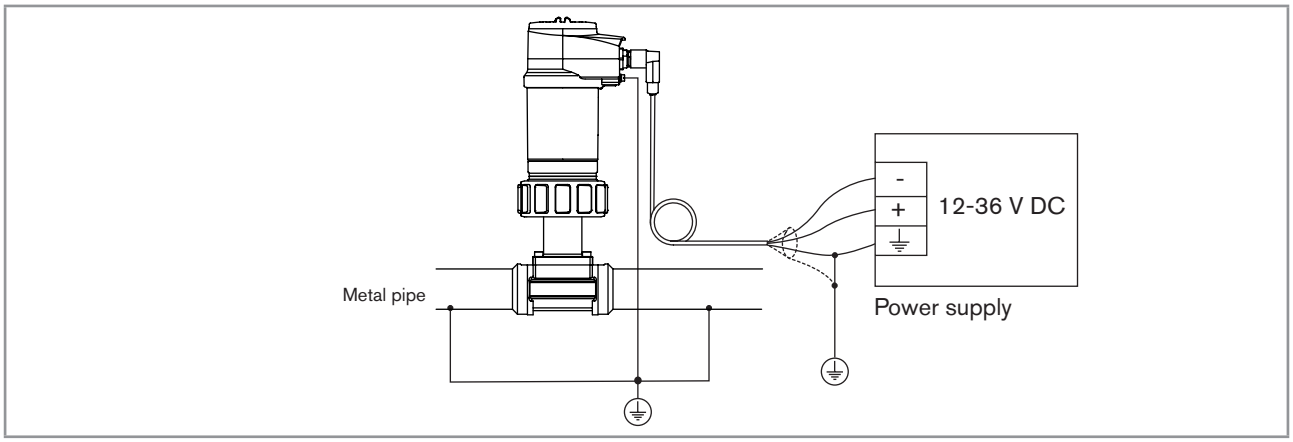


Fig. 14: Equipotentiality skeleton diagram with pipes in metal

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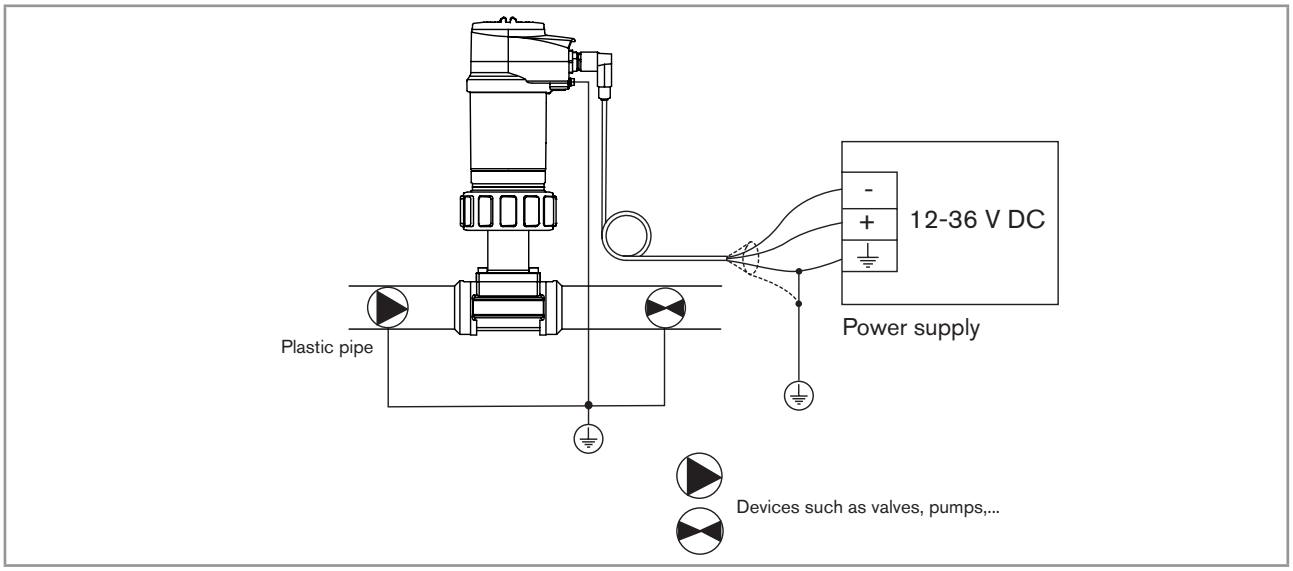

Fig. 15: Equipotentiality skeleton diagram with pipes in plastic

8.3.3 Wiring a version with a single M12 fixed connector

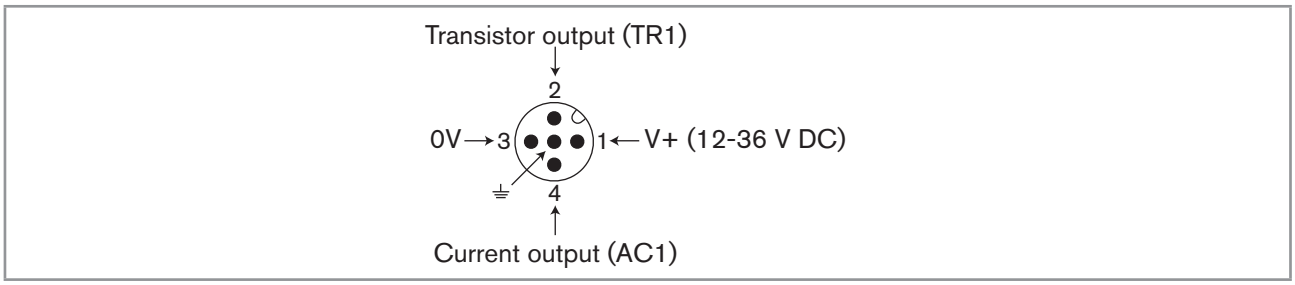

Fig. 16: Pin assignment of the male fixed connector on a version with a single M12 fixed connector

Pin of the M12 female cable available as an accessory (order code 438680)	**Colour of the wire**
1	brown
2	white
3	blue
4	black
5	grey

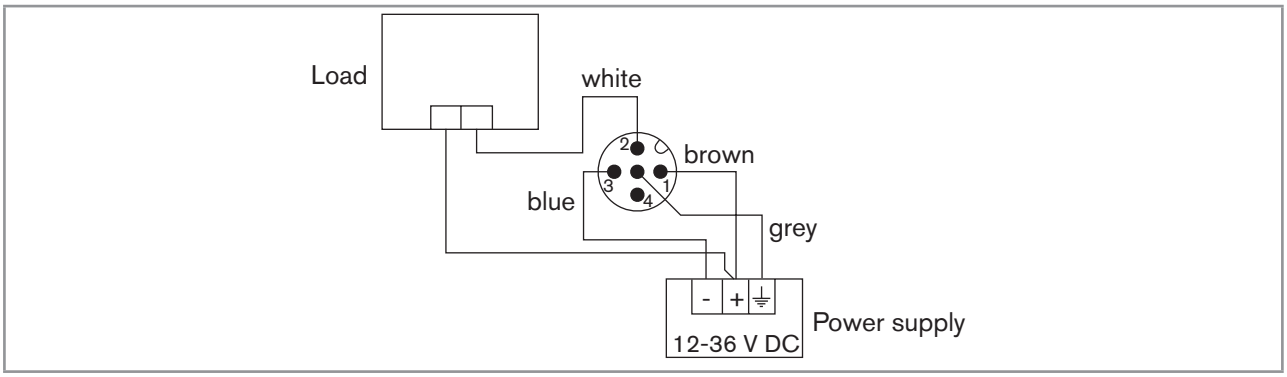

Fig. 17: NPN wiring of the transistor output of a version with 1 fixed connector (parameter setting "NPN/sink")

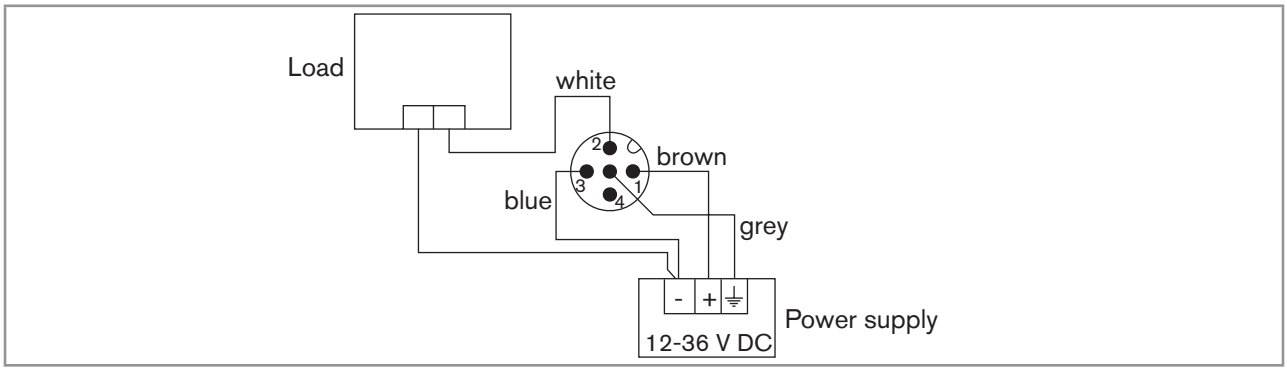

Fig. 18: PNP wiring of the transistor output of a version with 1 fixed connector (parameter setting "PNP/source")

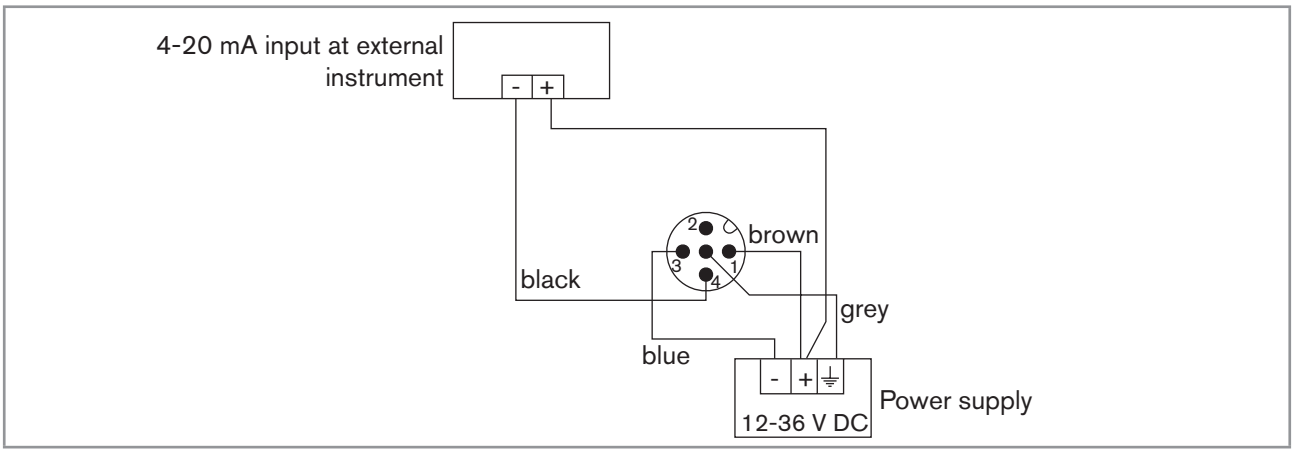

Fig. 19: Wiring in sinking mode of the current output of a version with 1 fixed connector (parameter setting "NPN/sink")

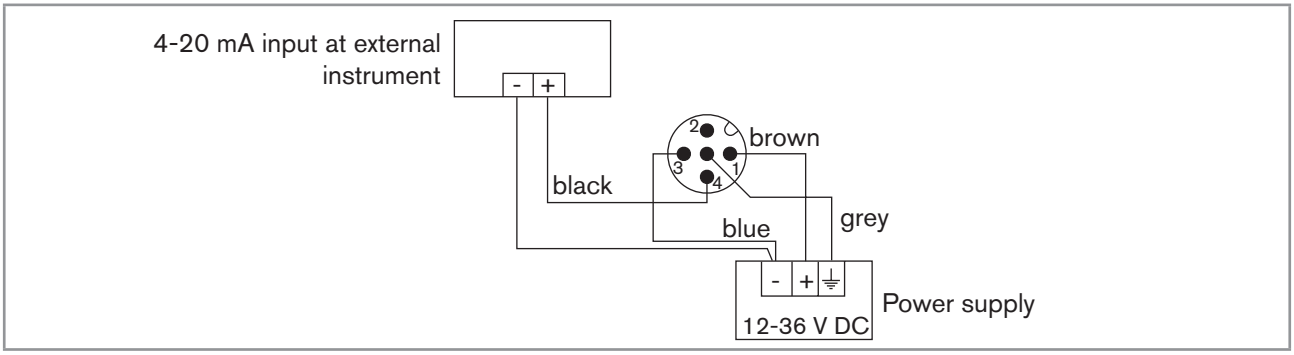

Fig. 20: Wiring in sourcing mode of the current output of a version with 1 fixed connector (parameter setting "PNP/source")

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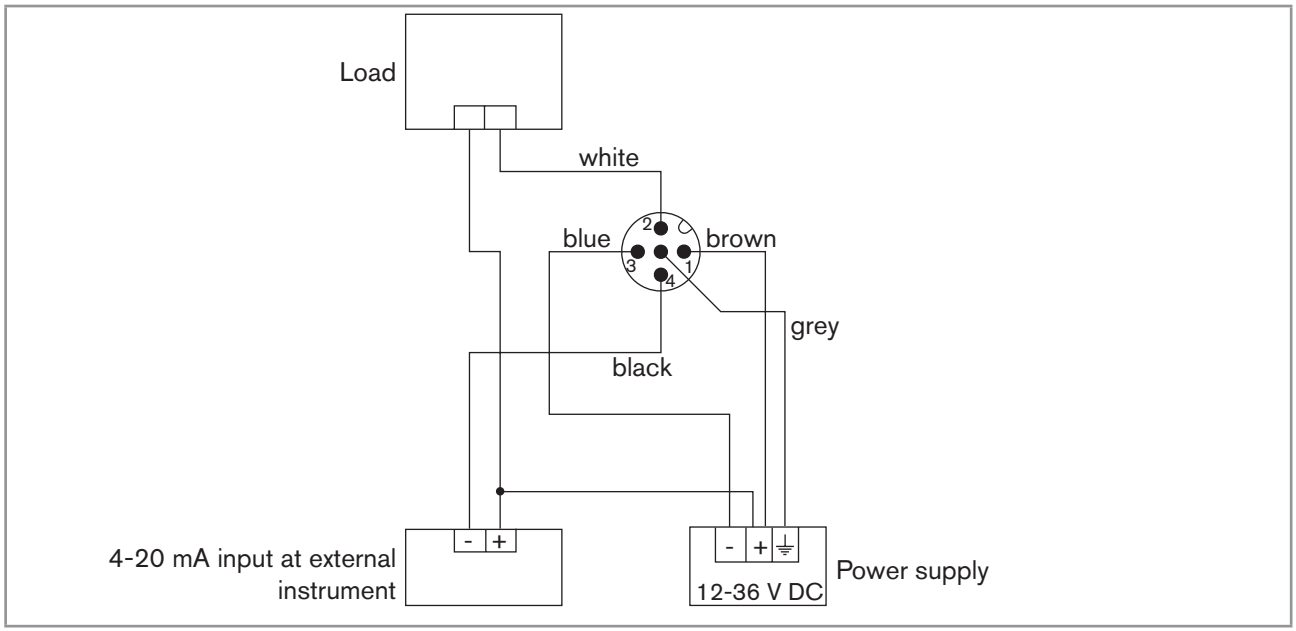

Fig. 21: NPN wiring of the transistor output and and wiring in sinking mode of the current output of a version with 1 fixed connector (parameter setting "NPN/sink")

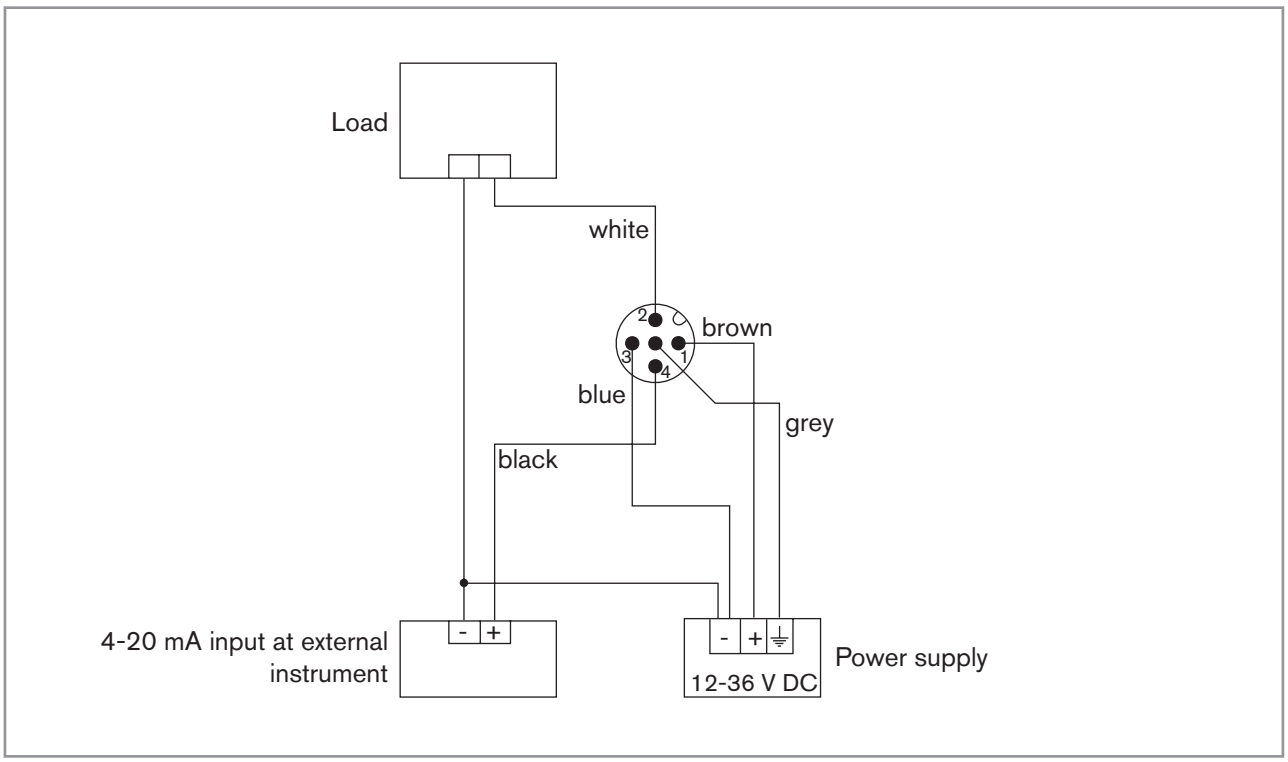

Fig. 22: PNP wiring of the transistor output and and wiring in sourcing mode of the current output of a version with 1 fixed connector (parameter setting "PNP/source")

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8.3.4 Wiring a version with 2 M12 fixed connectors

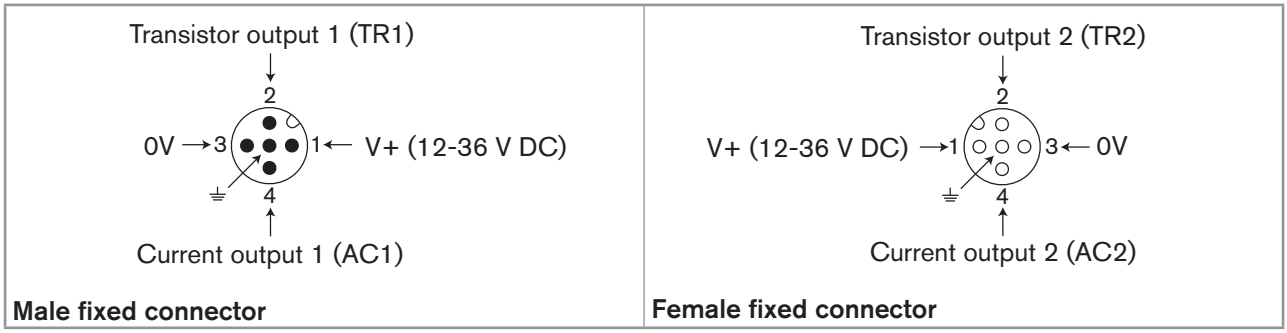

Fig. 23: Pin assignment of the male and female M12 fixed connectors

Connect the power supply for the device to the male fixed connector; the supply is then transferred internally to pins 1 and 3 of the female fixed connector in order to ease wiring of the load to the female fixed connector.

Pin of the female or male M12 cables available as accessories (order code 438680 respectively 559177)	Colour of the wire
1	brown
2	white
3	blue
4	black
5	grey

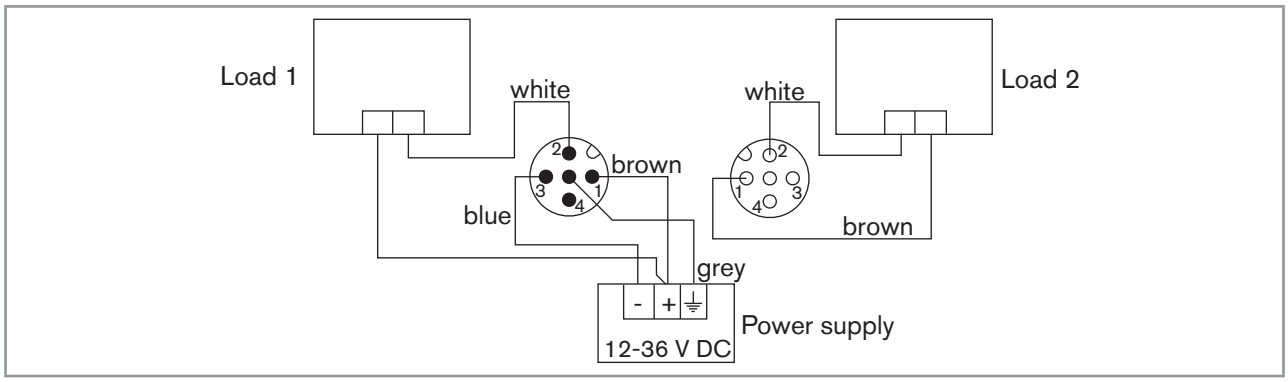

Fig. 24: NPN wiring of both transistor outputs of a version with 2 M12 fixed connectors (parameter setting "NPN/sink")

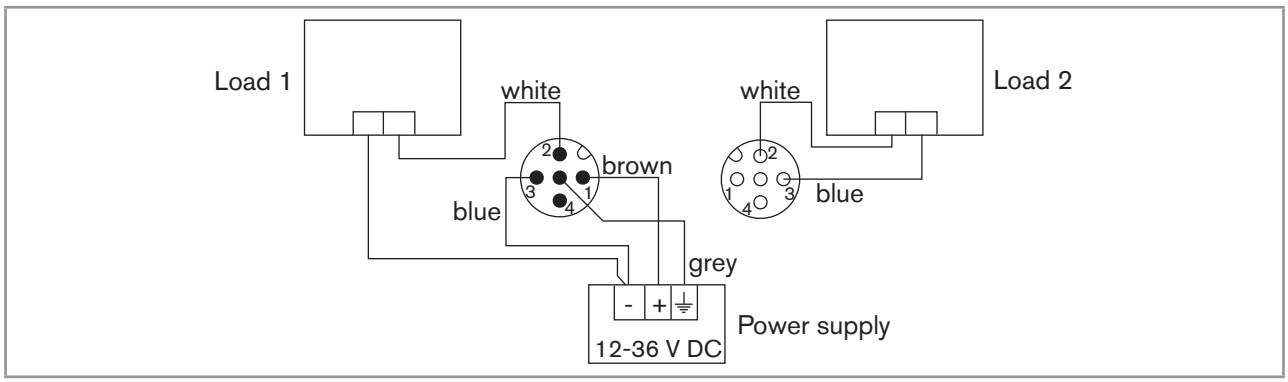

Fig. 25: PNP wiring of both transistor outputs of a version with 2 M12 fixed connectors (parameter setting "PNP/source")

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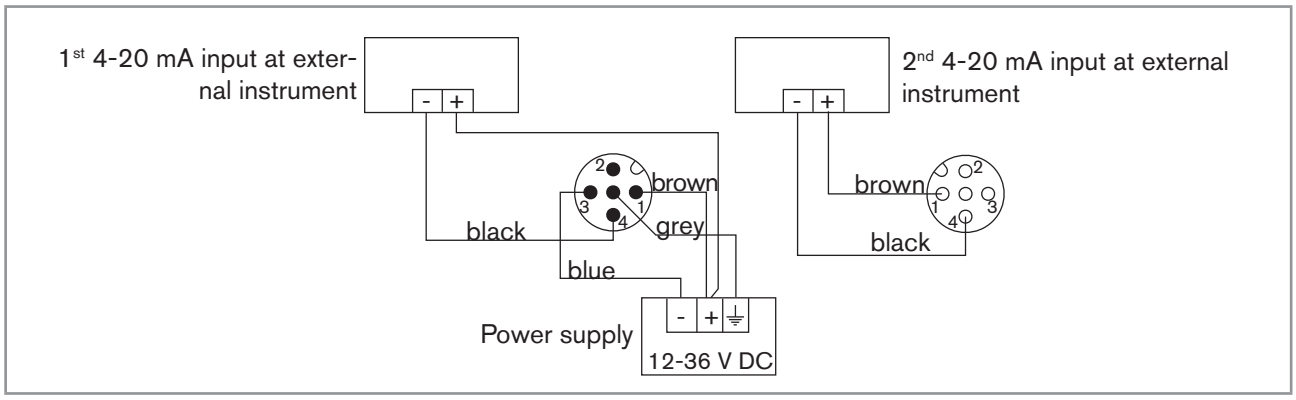

Fig. 26: Wiring of both current outputs in sinking mode, on a version with 2 fixed connectors (parameter setting "NPN/sink")

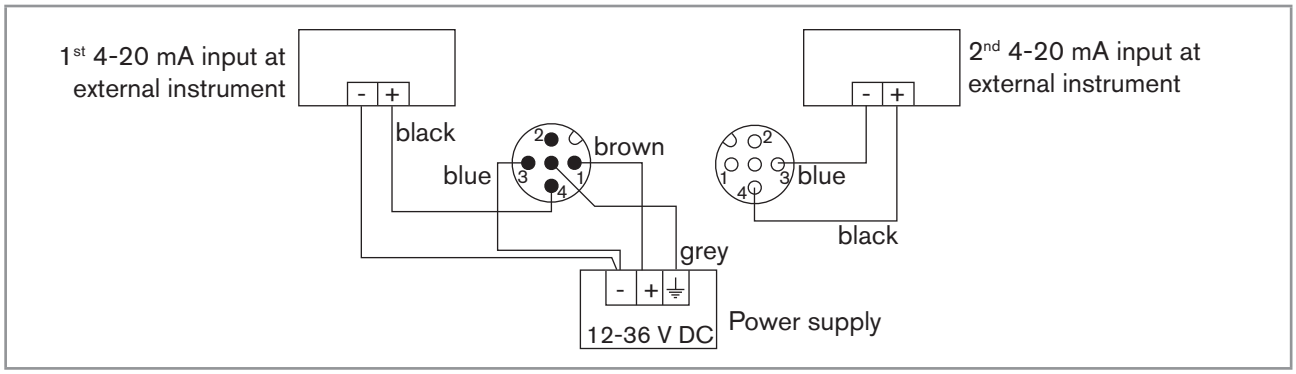

Fig. 27: Wiring of both current outputs in sourcing mode, on a version with 2 fixed connectors (parameter setting "PNP/source")

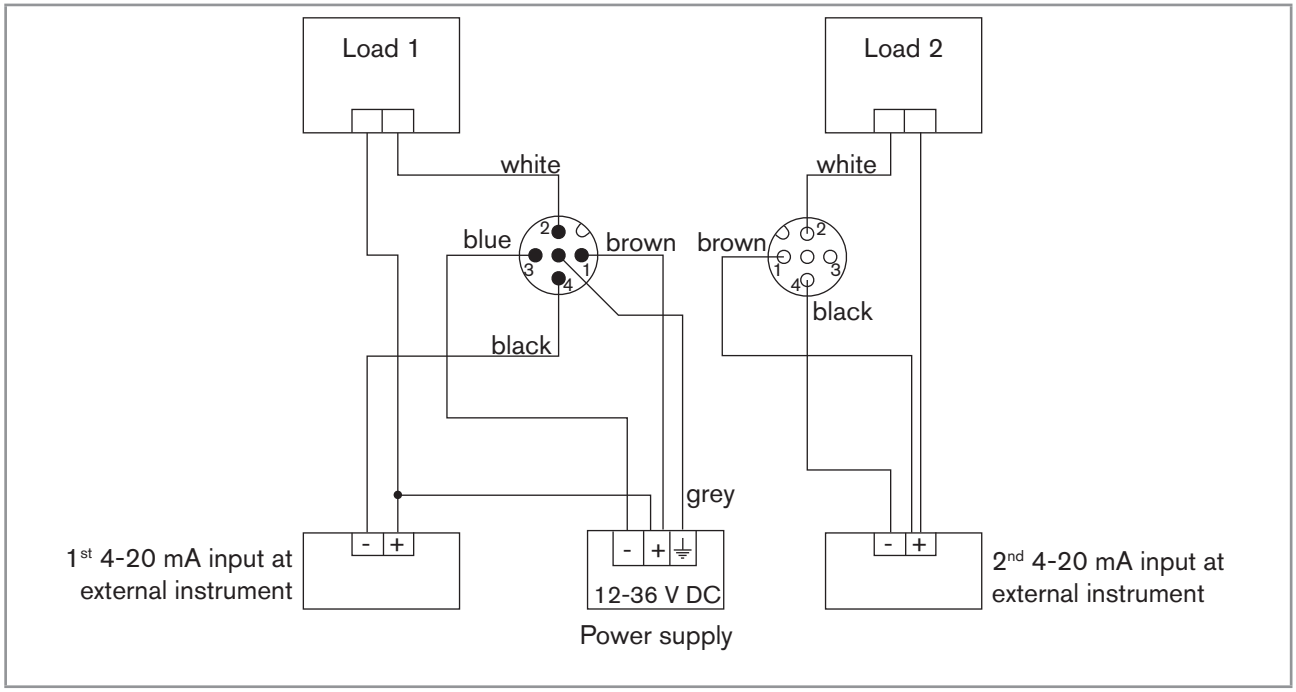

Fig. 28: NPN wiring of both transistor outputs and wiring of both current outputs in sinking mode, on a version with 2 fixed connectors (parameter setting "NPN/sink")

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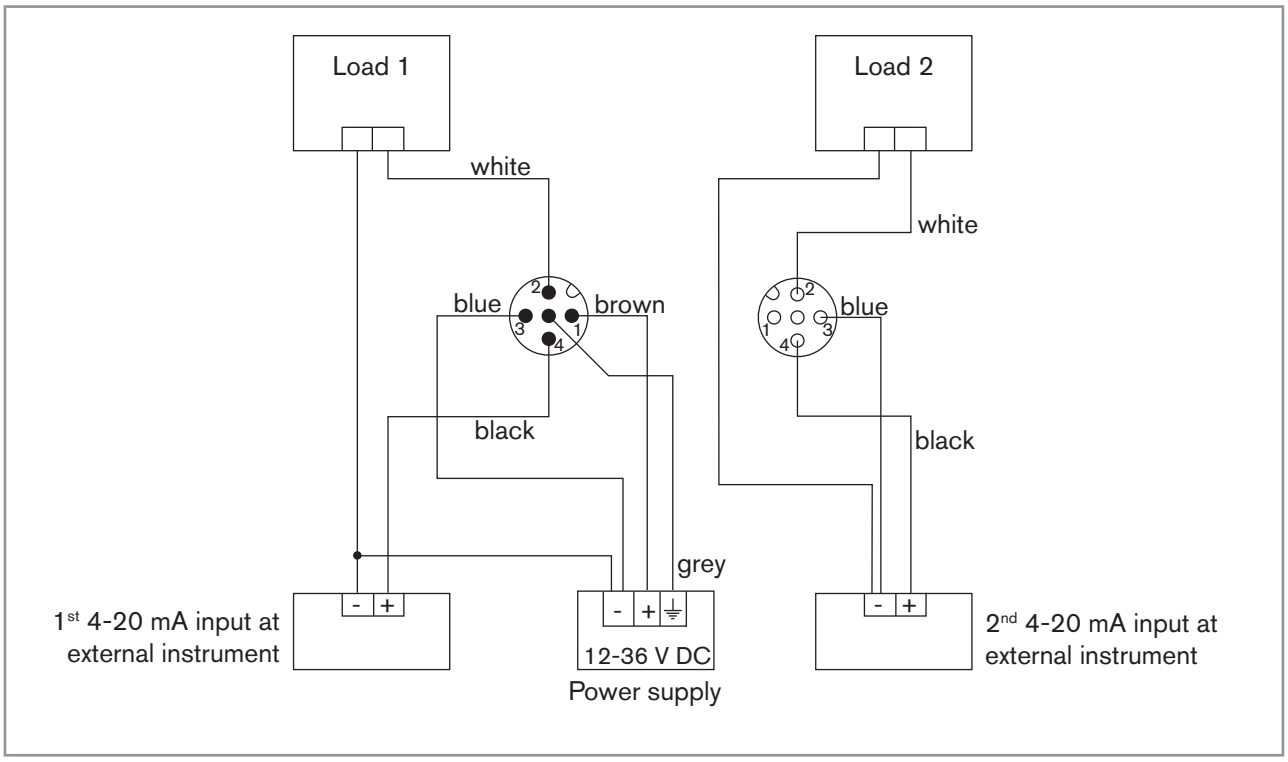

Fig. 29: PNP wiring of both transistor outputs and wiring of both current outputs in sourcing mode, on a version with 2 fixed connectors (parameter setting "PNP/source")

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9 OPERATING AND COMMISSIONING

- The settings can only be done on a device with a display module.
- Do not remove the display module while making the settings on the device.

9.1 Safety instructions

WARNING

Risk of injury due to non-conforming operating.

Non-conforming operating could lead to injuries and damage the device and its surroundings.

- The operators in charge of operating must have read and understood the contents of this manual.
- In particular, observe the safety recommendations and intended use.
- The device/installation must only be operated by suitably trained staff.

WARNING

Danger due to non-conforming commissioning.

Non-conforming commissioning could lead to injuries and damage the device and its surroundings.

- Before commissioning the device, calibrate the conductivity sensor. See chap. "9.12.4".
- Before commissioning, make sure that the staff in charge have read and fully understood the contents of the manual.
- In particular, observe the safety recommendations and intended use.
- The device / the installation must only be commissioned by suitably trained staff.
- Set the correction factor of the fitting used. See chap. "9.12.4".

9.2 Knowing the operating levels

The device has 2 operating levels:

Process level

This level is used:

- to read the measured values of 2 measurable variables selected in the Parameters menu,
- to read both the lowest and highest values of the chosen measurable variable, that have been measured by the device since the power-up of the device or since the latest reset (this feature is not active by default),
- to reset both the lowest and highest values of the chosen process value, if the feature has been activated,
- to read the current values emitted on the 4-20 mA outputs,
- to get the state of the device and the conductivity sensor with the icons.

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Configuration level

This level comprises 5 menus:

Menu title	Relevant icon
"Param": see chap. "9.11"	
"Calib": see chap. "9.12"	
"Diagnostic": see chap. "9.13"	
"Test": see chap. "9.14"	
"Info": see chap. "9.15"	

9.3 Using the navigation button

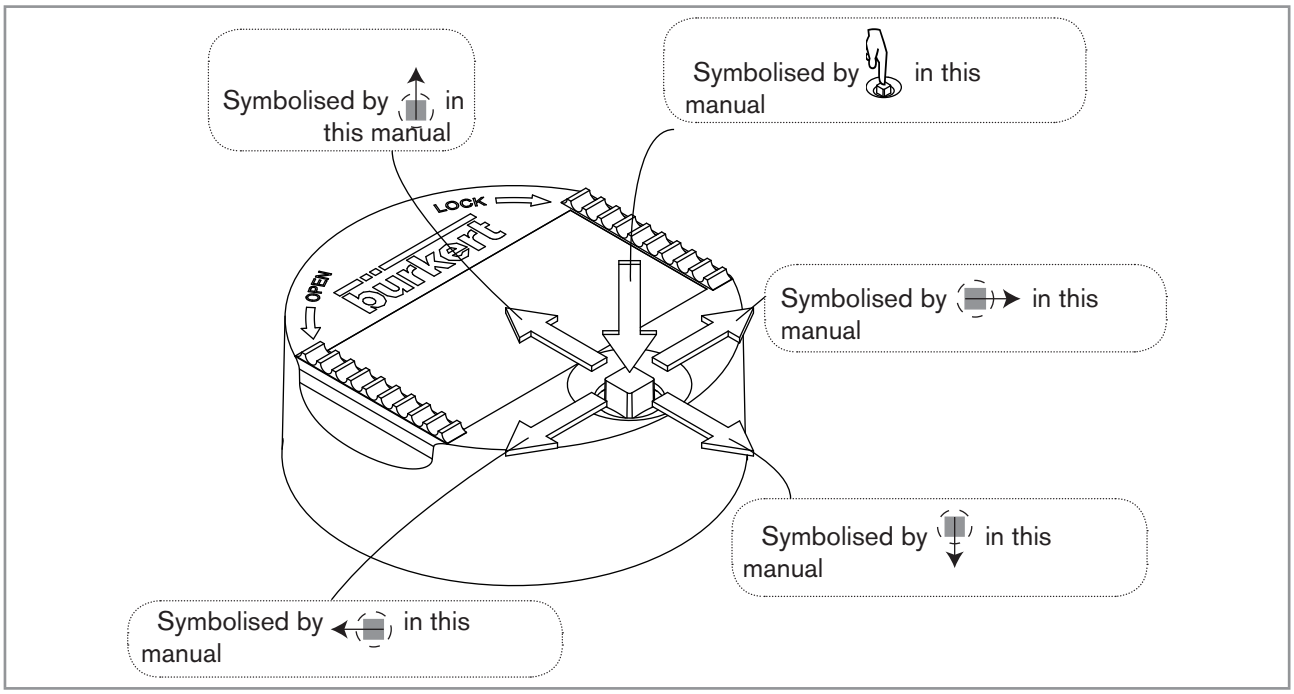

Fig. 30: Using the navigation button

You want to...	Press...
...browse in the Process level	▪ next screen: ▪ previous screen:

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You want to...	Press...
▪ ...access the Settings level ▪ ...display the Param menu	 for at least 2 sec., from any screen of the Process level
...browse in the menus of the Settings level	▪ next menu:  ▪ previous menu: 
...access the menu displayed	
...browse in the menu functions	▪ next function:  ▪ previous function: 
...select the highlighted function	
...browse in the dynamic functions bar (MEAS, BACK, ABORT, OK, YES, NO)	▪ next function:  ▪ previous function: 
...confirm the highlighted dynamic function	
...modify a numerical value	
- increment the figure selected	- 
- decrement the figure selected	- 
- select the previous figure	- 
- select the next figure	- 
- allocate the "+" or "-" sign to the numerical value	-  to the extreme left of the numerical value then  until the desired sign is displayed
- move the decimal point	-  to the extreme right of the numerical value then  until the decimal point is in the desired place

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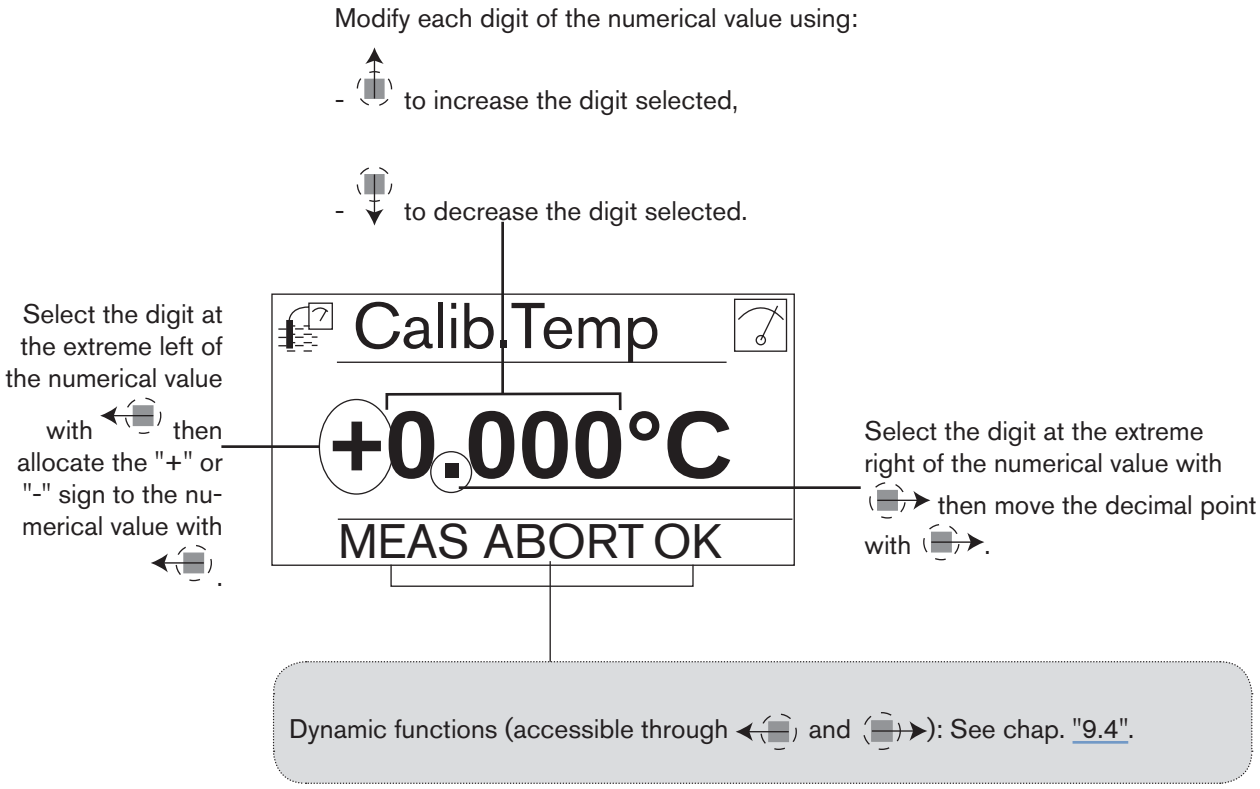
9.4 Using the dynamic functions

You want to...	Choose...
...go back to the Process level, without confirming the modifications made	dynamic function "MEAS"
...validate the input	dynamic function "OK"
...go back to the parent menu	dynamic function "BACK"
... abort the current operation and go back to the parent menu	dynamic function "ABORT"
...answer the question asked	dynamic function "YES" or "NO"

9.5 Entering a numerical value (example)



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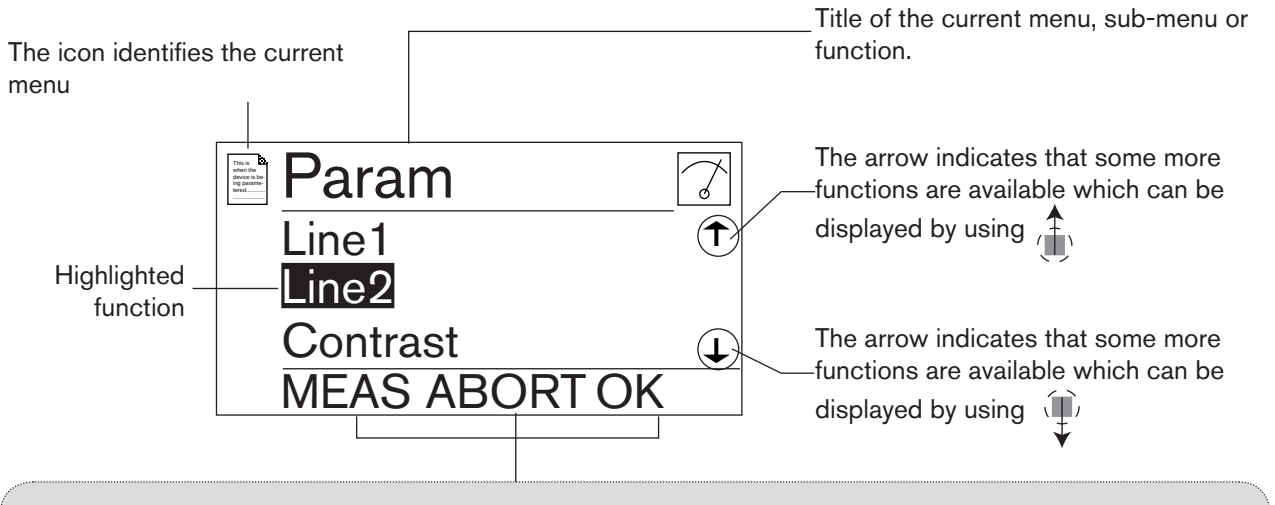
9.6 Browsing in a menu (example)



Dynamic functions (accessible through ◄ and ►): See chap. "9.4".

9.7 Knowing the display

The display module is only equipped on some versions of the device. It can be ordered as an accessory.

9.7.1 Knowing the icons and LEDs

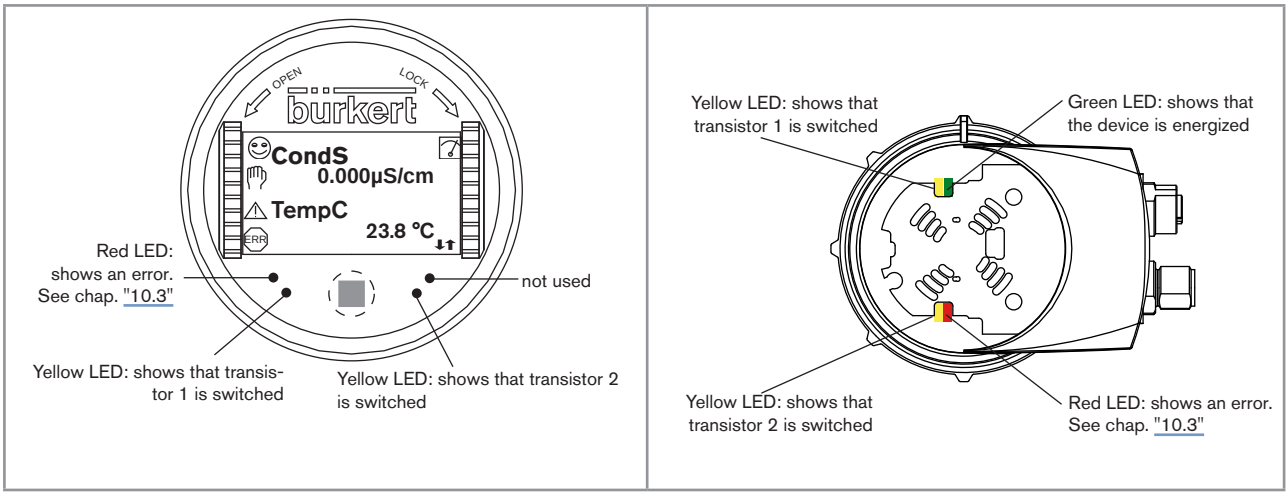


Fig. 31: Position of the symbols and description of the LEDs with or without display module

The LEDs of the display module are duplicated on the electronic board that is located under the display module: these LEDs can only be seen if the device has no dispaly module.

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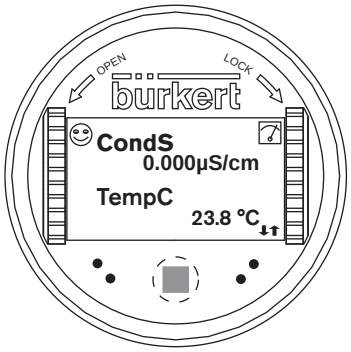
Icon	Meaning and alternatives
	Sensor in good condition, fluid conductivity and fluid temperature within the set ranges. If the monitoring of the conductivity and/or the fluid temperature and/or the fluid conductivity has been activated, the alternative icons in this position are: ▪ , associated with : see chap. "9.13.2", chap. "9.13.3", chap. "9.15.1", chap. "10.3" ▪ , associated with : see chap. "9.13.2", chap. "9.13.3", chap. "9.15.1", chap. "10.3"
	The device is measuring. The alternative icons in this position are: ▪ HOLD flashing: function HOLD is active (see chap. "9.12.1") ▪ T: running check that the outputs are working and behaving correctly (see chap. "9.14.2" and chap. "9.14.3")
	"maintenance" message; See chap. "9.12.4", chap. "9.15.1", chap. "10.3"
	"warning" message; See chap. "9.11.10", chap. "9.13.2", chap. "9.13.3", chap. "9.15.1", chap. "10.3"
	"error" message; See chap. "9.11.9", chap. "9.13.2", chap. "9.13.3", chap. "9.15.1", chap. "10.3"

9.7.2 Knowing the display at the power-up of the device

When the device is powered up or the display module mounted on the electronic module, the display indicates the software version of the display module. The display then shows the first screen of the Process level:



See chap. "9.11.5" and "9.11.6" to choose the data to be displayed in the Process level.

Fig. 32: Display indications after power-up of the device

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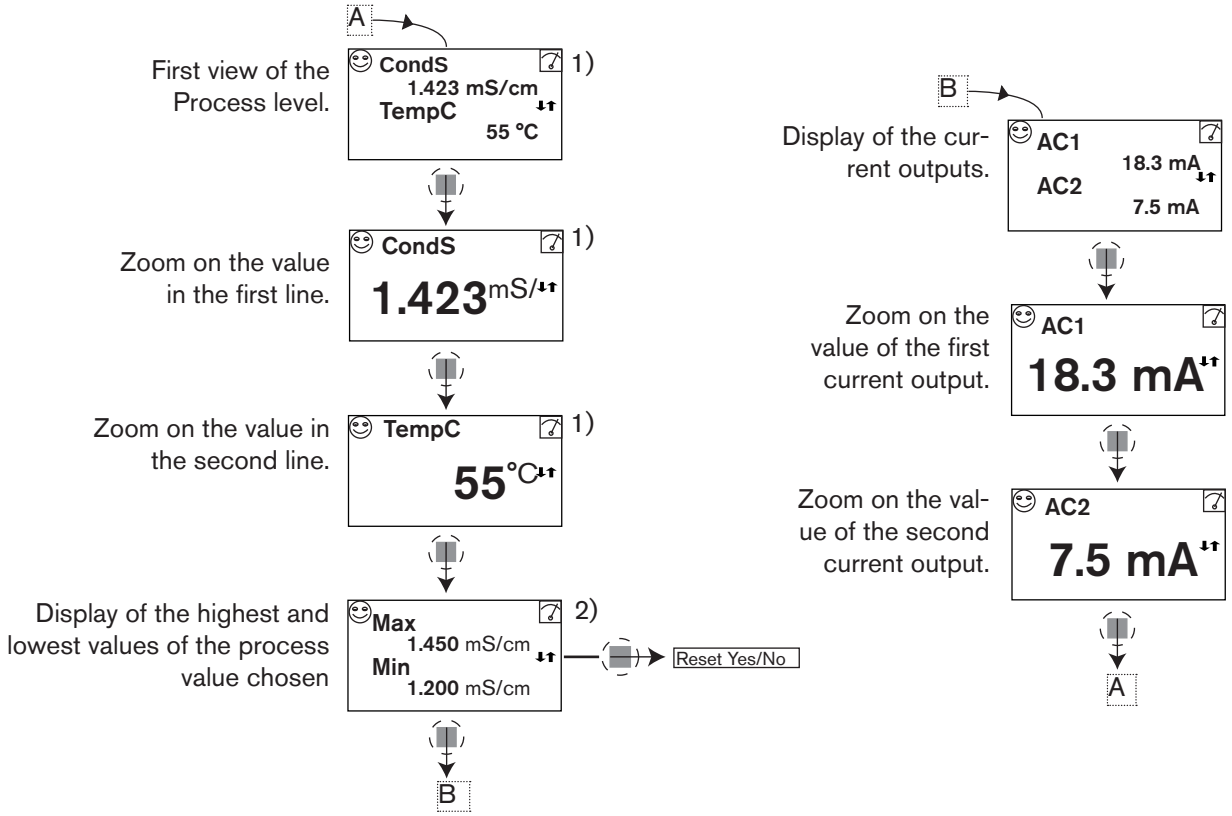
9.8 Knowing the Process level



[1] To choose the measurable variables to be displayed, see chap."9.11.5"

[2] The display of the lowest and highest values in the Process level is deactivated by default. To activate the feature and choose the measurable variables, see chap. "9.11.6".

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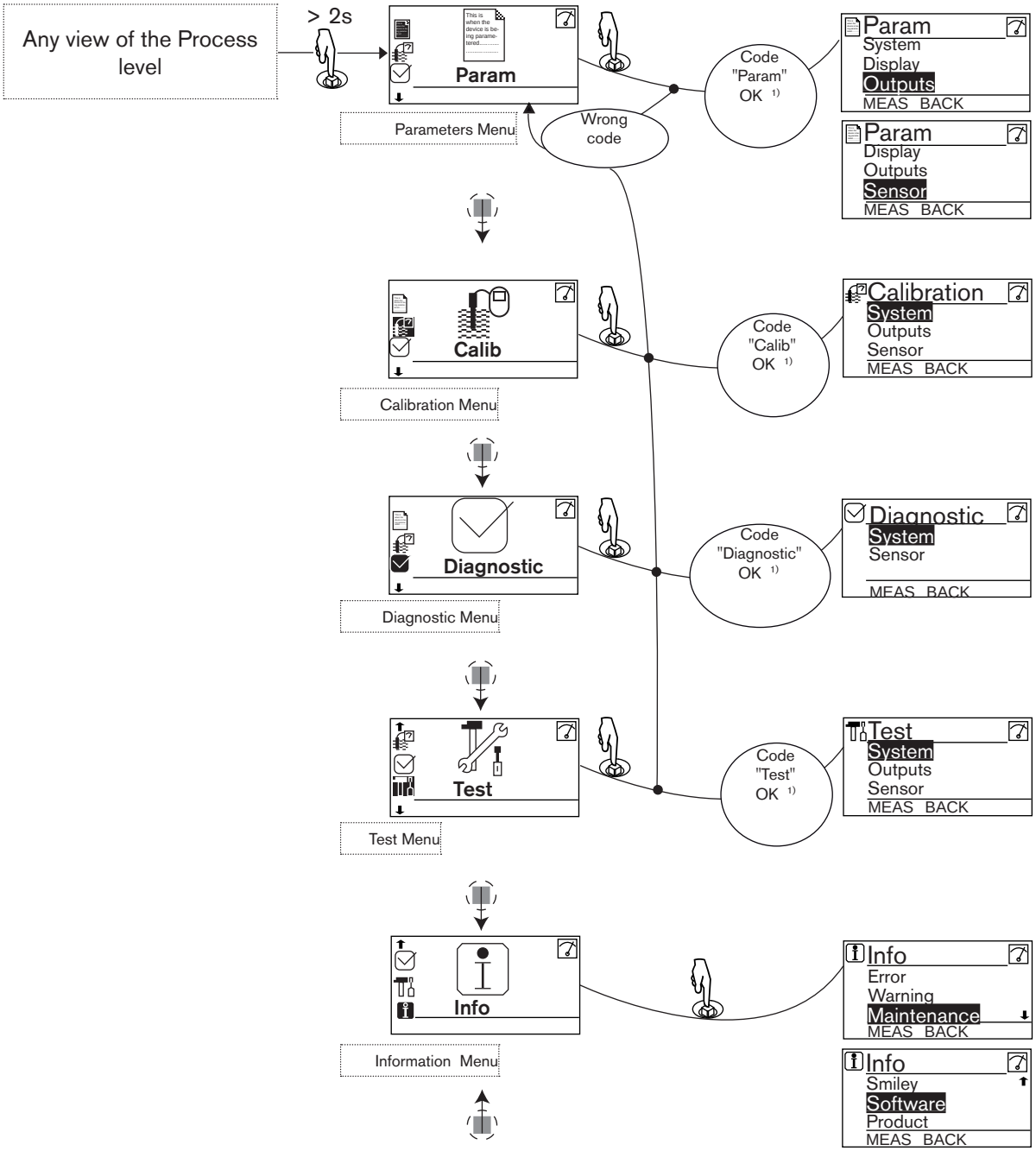
9.9 Accessing the Configuration level



1) Only if the access code to the menu has been customized. See chap. "9.11.3", "9.12.2", "9.13.1" and "9.14.1".

→ See chap. "9.10" for the detailed menu functions

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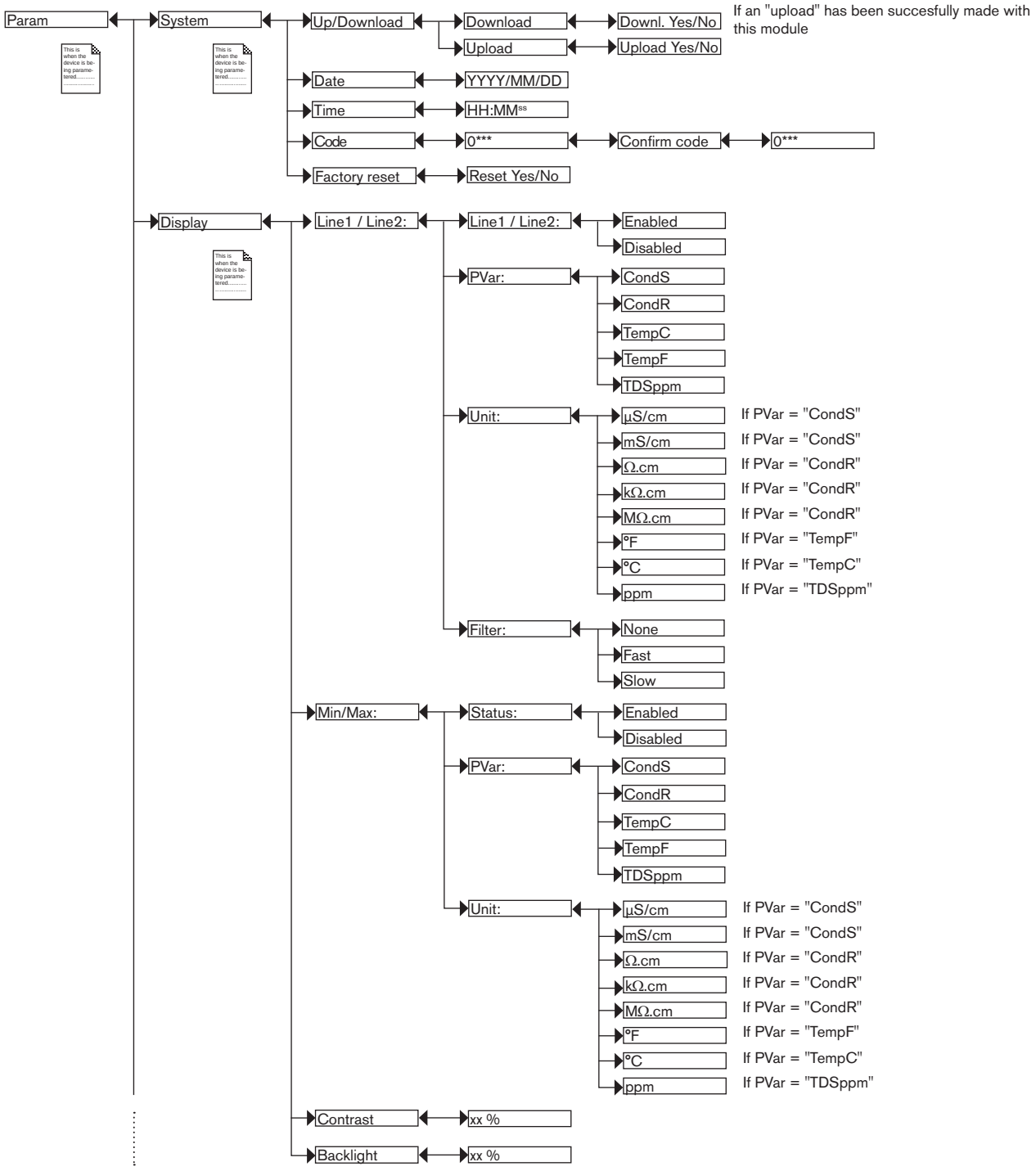
9.10 Knowing the structure of the menus of the Configuration level

See chap. "9.9" to access the Configuration level.



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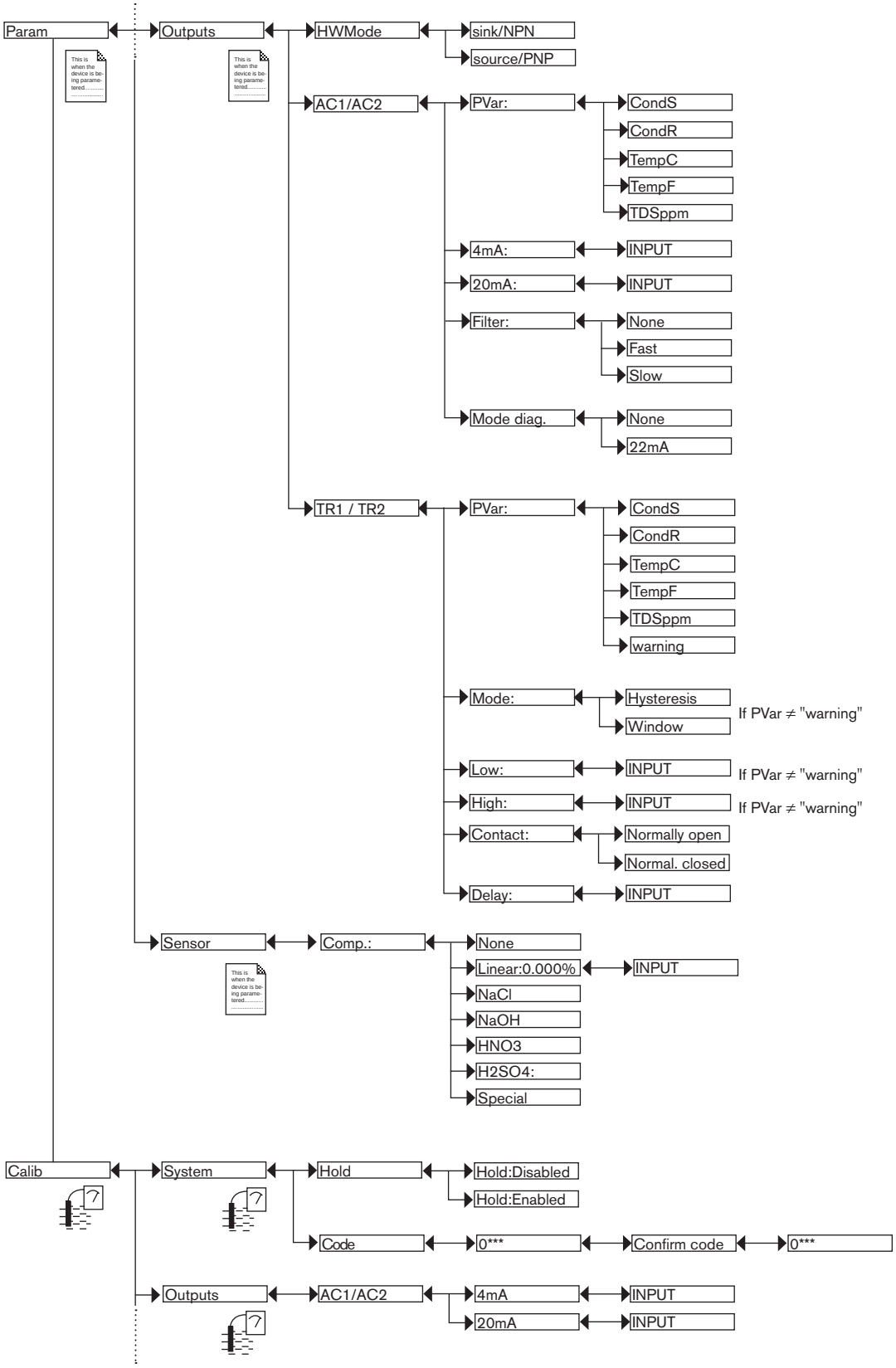

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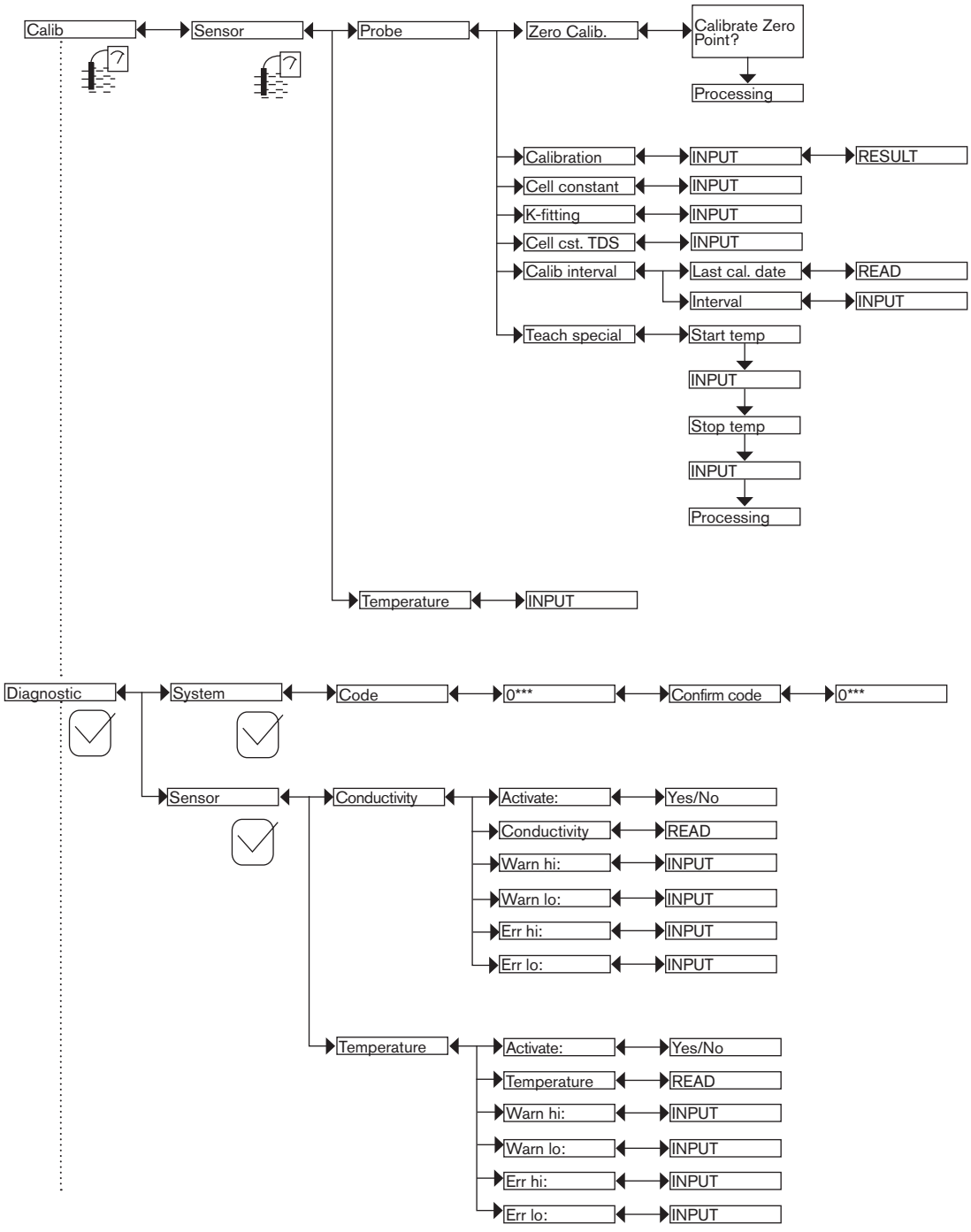

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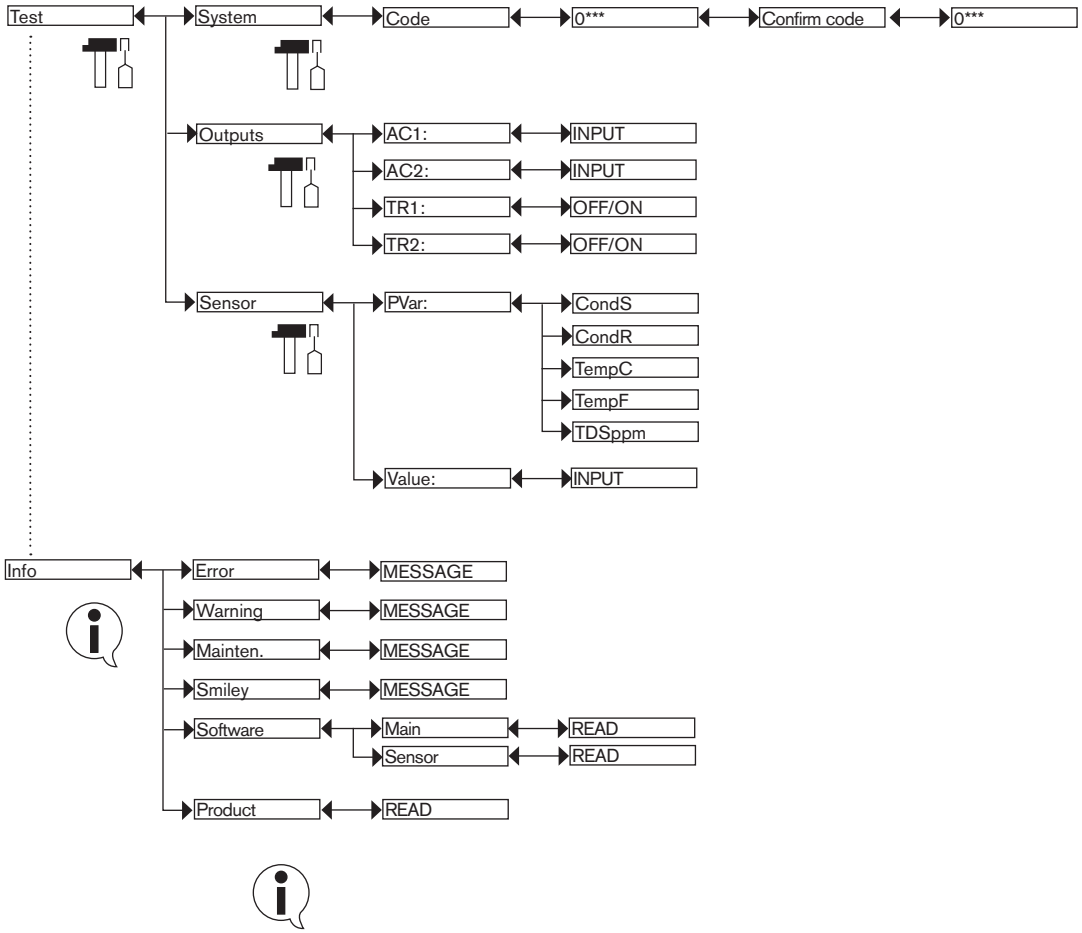

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9.11 Knowing the Parameters menu

9.11.1 Transferring data from one device to another

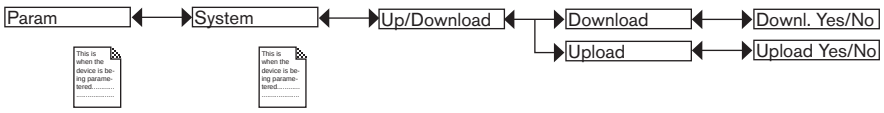
See chap. "9.9" to access the Parameters menu.

This function is only possible with a display module with software version V2.

- The software version of the display module is displayed when the display module is powered up.

- Function "DOWNLOAD" is only present if an "UPLOAD" has been successfully carried out.
- Never interrupt a data transfer else the device could be damaged.

The compensation curve determined with the function TEACH SPECIAL (see chap. "9.12.4") cannot be transferred to another device.



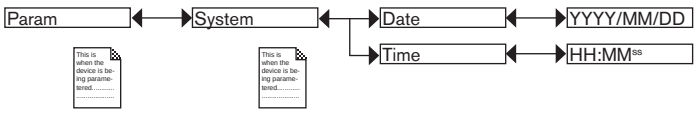
The following data can be transferred from a device to another device of the same type:

- user set data of the PARAM menu (except the date, the time, the contrast and brightness levels for the display),
- user set data of the DIAGNOSTIC menu,
- the TDS factor set in the menu Calib -> Sensor -> Probe -> Cell cst TDS,
- the correction factor set in the menu Calib -> Sensor -> Probe -> K-fitting,
- the periodicity of calibrations set in the menu Calib -> Sensor -> Probe -> Calib interval,
- the access codes to the menus.

DOWNLOAD: transfer the data previously uploaded in the display module with the "UPLOAD" function.
The parameters transferred are used by the device as soon as the message “Download OK” is displayed.
UPLOAD: upload data from the device to the display module.

9.11.2 Setting the date and time

See chap. "9.9" to access the Parameters menu.



DATE: set the date (input format: year/month/day in the form YYYY/MM/DD)
TIME: set the time (input format: hours:minutes^{secondes})

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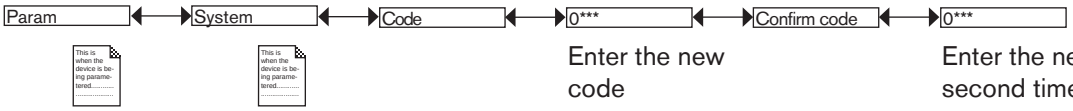
9.11.3 Modifying the PARAM menu access code

See chap. "9.9" to access the Parameters menu.



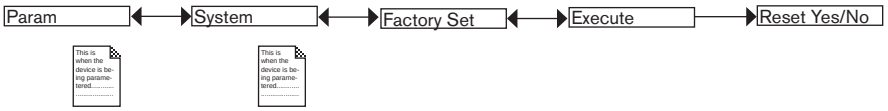
If the default code (0000) is entered, the code will not be requested to access the menu.

9.11.4 Restoring the default parameters of the Process level and the outputs

See chap. "9.9" to access the Parameters menu.

The following data can be restored to their default values:

- user set data of the PARAM menu (except the date, the time, the contrast and brightness levels for the display),
- user set data of the DIAGNOSTIC menu,
- the TDS factor set in the menu Calib -> Sensor -> Probe -> Cell cst TDS,
- the correction factor set in the menu Calib -> Sensor -> Probe -> K-fitting,
- the periodicity of calibrations set in the menu Calib -> Sensor -> Probe -> Calib interval,
- the access codes to the menus.



→ Choose “Yes” to restore the default values.

→ Choose “No” to keep the set values.

9.11.5 Setting the data displayed in the Process level

See chap. "9.9" to access the Parameters menu.

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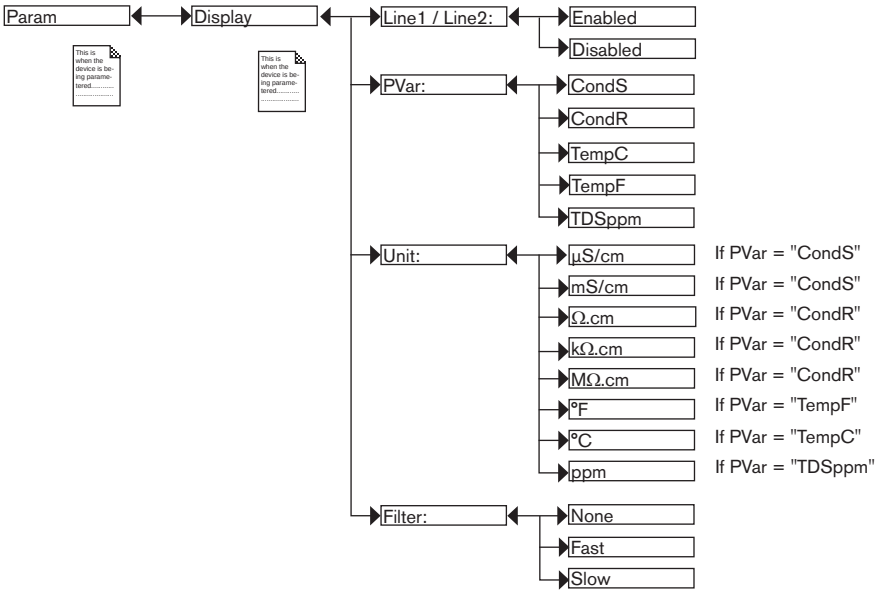

PVAR: choose the process value to be displayed on the line selected.

UNIT: choose the unit for the process value displayed.

FILTER: choose the filter level for the measurement values displayed on the line selected. Three filter levels are proposed: “slow”, “fast” or “none”.

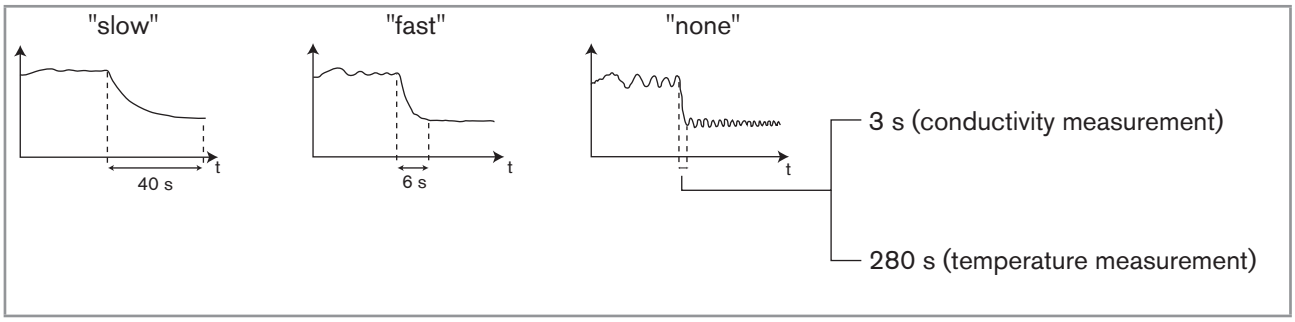

Fig. 33: Filter curves

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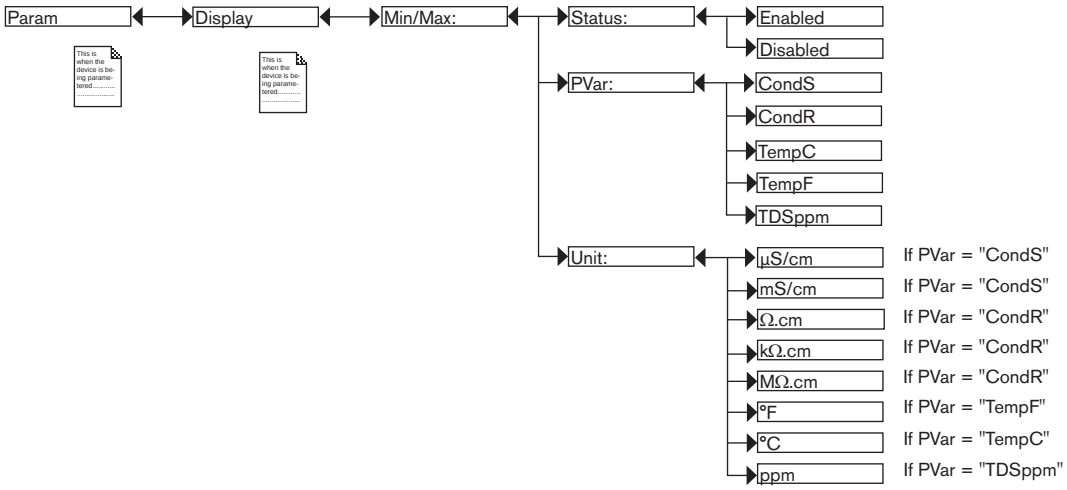
9.11.6 Displaying of the lowest and highest values measured

See chap. "9.9" to access the Parameters menu.



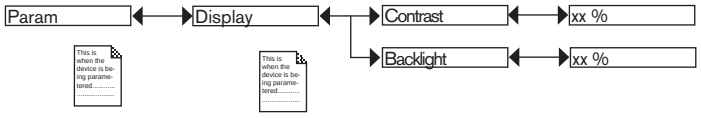
STATUS: choose to display (choice “Enabled”) or not display (choice “Disabled”) the highest and lowest measured values (of the measurable variable chosen in PVAR hereafter) since the latest reset or the power-up of the device.

PVAR: choose the measurable variable which highest and lowest measured values are displayed in the Process level.

UNIT: choose the preferred unit in which the lowest and highest measured values are displayed.

9.11.7 Setting the display contrast and brightness

See chap. "9.9" to access the Parameters menu.



→ Set each percentage using  and  .

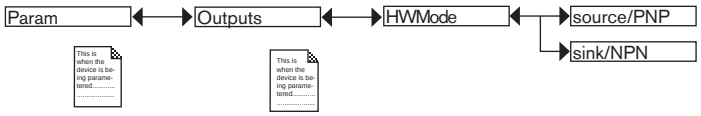
CONTRAST: choose the display contrast level (as a %).

BACKLIGHT: choose the light intensity of the display (as a %).

These settings only affect the display module. They are not factored in during a device data UPLOAD (see chap. "9.11.1").

9.11.8 Choosing the output wiring mode

See chap. "9.9" to access the Parameters menu.



The wiring mode is the same for all outputs.

→ If "sink/ NPN" is set, wire the current outputs in sinking mode and the transistor outputs in NPN.

→ If "source/ PNP" is set, wire the current outputs in sourcing mode and the transistor outputs in PNP.

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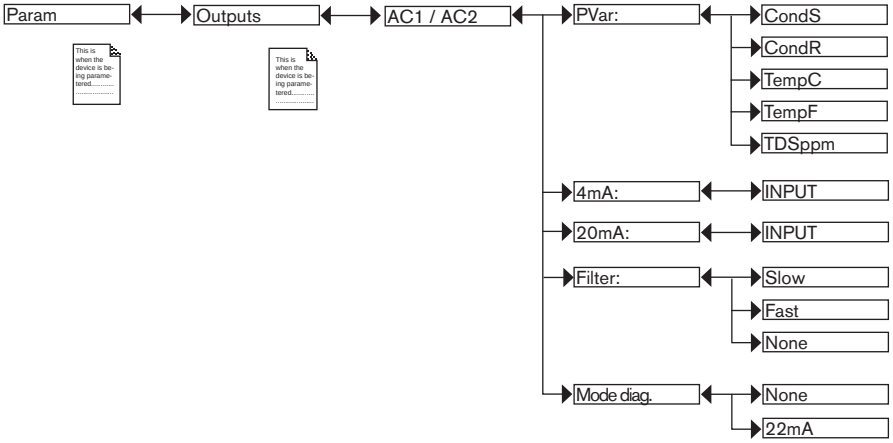
See the wiring for the outputs in chap. "8.3".

9.11.9 Setting the parameters of the current outputs

See chap. "9.9" to access the Parameters menu.

The 2nd current output “AC2” is only available on a version with 2 fixed connectors.



PVAR: choose a process value (impedance in Ω.cm, conductivity in S/cm, temperature in °C, temperature in °F or total dissolved solids in ppm) associated with current output 1 resp. current output 2.

Functions “4mA” and “20mA” are used to define the measurement range for the process value associated with the current on the 4-20 mA output.

P_1 and P_2 are the values associated with a current of 4 mA or 20 mA respectively:

If P_1 is higher than P_2, the signal is inverted and the range P_1-P_2 corresponds to the range for the 20-4 mA current.

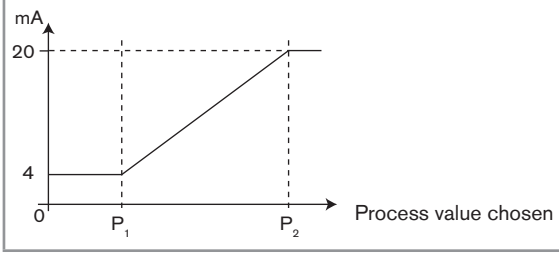


Fig. 34: 4-20 mA current depending on the process value selected

4mA: choose the value of the process value (previously selected), associated with a current of 4 mA, for each current output.

20mA: choose the value of the process value (previously selected), associated with a current of 20 mA, for each current output.

FILTER: choose the level of damping for the fluctuations of the current value for each current output. Three filter levels are proposed: slow, fast or none. The damping for the current outputs is similar to the damping of the display. See "Fig. 33", chap. "9.11.5".

MODE DIAG.: choose to emit a current of 22 mA on the current output selected when an “error” event related to diagnostics (see chap. "9.13.2" and chap. "9.13.3") is generated by the device or allow the current output to operate normally (choose "none").

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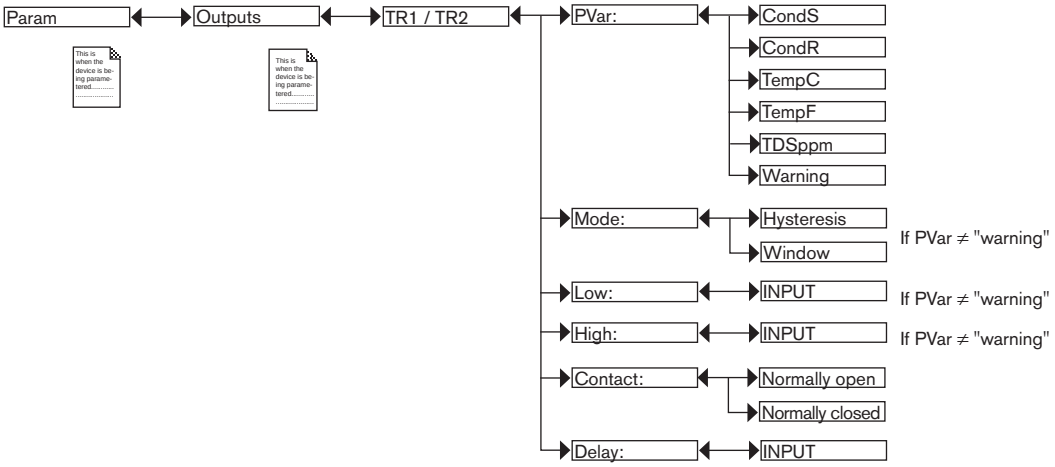
An "error" event linked to a malfunction of the device is always indicated by the generation of a 22 mA current, whatever the adjustmant made in the function "MODE DIAG.".

See also "Solving a problem" at chap. "10.3".

9.11.10 Setting the parameters of the transistor outputs

See chap. "9.9" to access the Parameters menu.



PVAR: choose a measurable variable (impedance in Ω.cm, conductivity in S/cm, temperature in °C, temperature in °F or total dissolved solids in ppm) associated with transistor output 1 resp. transistor output 2 or associate the “warning” message (see chap. "9.12.4", chap. "9.13.2" and chap. "9.13.3") with transistor output 1 resp. transistor output 2.
If the selected transistor output is linked to the "warning" event, the transistor switches as soon as such an event is generated by the device.

See also "Solving a problem" at chap. "10.3".

MODE: choose the operating, hysteresis or window, for transistor output 1 or transistor output 2. See "Fig. 35" and "Fig. 36".

LOW: enter the low switching threshold value for transistor output 1 or transistor output 2. See "Fig. 35" and "Fig. 36".

HIGH: enter the high switching threshold value for transistor output 1 or transistor output 2. See "Fig. 35" and "Fig. 36".

CONTACT: choose the type of off-position (normally open, NO, or normally closed, NC) of transistor output 1 or transistor output 2. See "Fig. 35" and "Fig. 36".

DELAY: choose the value of the time delay prior to switching, for each transistor output.

Switching only occurs if one of the thresholds, high or low (functions “High” or “Low”), is exceeded for a duration longer than this time delay. See "Fig. 35" and "Fig. 36". The time delay before switching is applicable to both output thresholds.

Hysteresis operating

The change of status is done when a threshold is detected (increasing measured value: threshold high (function High) to be detected; decreasing measured value: threshold low (function Low) to be detected).

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Fig. 35: Hysteresis operating

Window operating

The change of status occurs whenever one of the thresholds is detected.

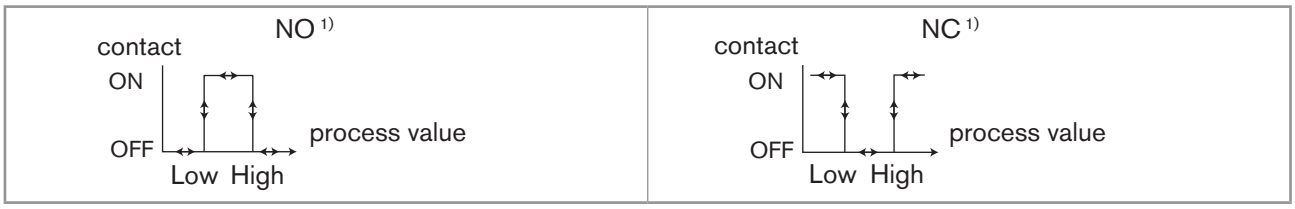


Fig. 36: Window operating

1) NO = Normally open; NC = Normally closed

9.11.11 Choosing the type of temperature compensation

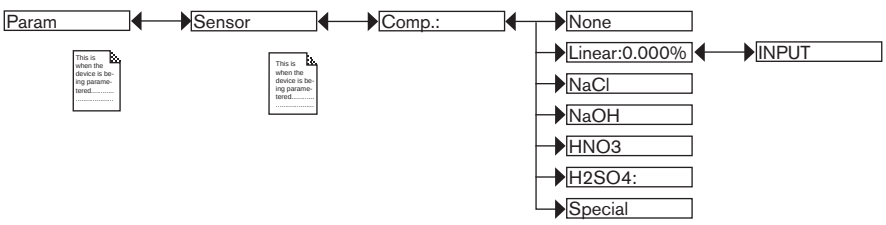
See chap. "9.9" to access the Parameters menu.

This menu is used to deactivate the temperature compensation (choice “none”) or choose the type of temperature compensation to determine the conductivity of the fluid:

- according to a linear percentage (choice “linear”). See below.
- or according to a predefined curve (choix "NaCl", "NaOH", "HNO_3" or "H_2SO_4").
  The compensation curve H_2SO_4 applies to a fluid temperature range of 5-55 °C and a concentration of 20,0%:
  The compensation curves for NaOH, HNO_3 and NaCl apply to a fluid temperature range of 10-80°C and for the following concentrations:
  - NaCl: 0,2 %
  - NaOH: 1,0 %
  - HNO_3: 1,0 %
- or according to a curve defined especially for your process (choice “Special”) using the “Teach special” function in the “Calibration - Sensor” menu, “Probe” function. See chap. "9.12.4".

If the choice "Special" is set for this function:

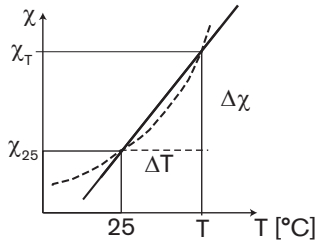
- and the compensation curve has not been determined (see chap. "9.12.4"), the measurements of the conductivity are not compensated in temperature.
- If the compensation curve has been determined (see chap. "9.12.4"), it is not uploaded with the function UPLOAD (see chap. "9.11.1").



Linear temperature compensation (choice “Linear”)

The linear temperature compensation may be sufficiently precise for your process whenever the temperature of your process is always > 0°C. Enter a compensation value (average compensation coefficient alpha) between 0.00 and 10.00 %/°C.

Use the following curve and equation to calculate the average value of the compensation coefficient α according to a temperature range ΔT and the associated conductivity range $\Delta\chi$:



$$\alpha = \frac{\Delta\chi}{\Delta T} \times \frac{1}{\chi_{25}}$$

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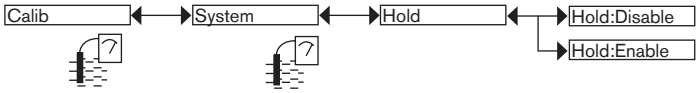
9.12 Knowing the Calibration menu

9.12.1 Activating/deactivating the Hold function

See chap. "9.9" to access the Calibration menu.



The HOLD function is automatically deactivated when the device restarts after a power interruption, if the Hold function was activated at the moment of the power cut-off.

The Hold function is used to carry out maintenance work without interrupting the process.

To activate the HOLD function:

→ enter the “HOLD” function;

→ choose “enabled”;

→ validate by “OK”.

When the function HOLD is active:

- the HOLD icon is displayed in place of the icon;
- the current emitted on each 4-20 mA output is fixed at the value of the last measurement of the process value associated with each output;
- each transistor output is fixed at the state acquired at the moment the HOLD function is activated;
- the HOLD function stays active until it is deactivated.

To deactivate the HOLD function:

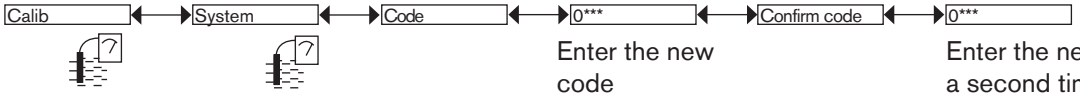
→ enter the “HOLD” function;

→ choose “disabled”;

→ validate by “OK”.

9.12.2 Modifying the Calibration menu access code

See chap. "9.9" to access the Calibration menu.



If the default code (0000) is entered, the code will not be requested to access the menu.

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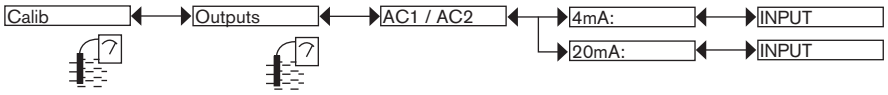
9.12.3 Adjusting the current outputs

See chap. "9.9" to access the Calibration menu.



4mA: adjust the current output 1 or current output 2 for 4 mA.

When the "4mA" function is selected, the device generates a current of 4 mA: measure the current emitted by the 4-20 mA output using a multimeter and enter the value given by the multimeter in the function “AC1.4mA” or “AC2.4mA”.

20mA: adjust the current output 1 or current output 2. for 20 mA

When the "20mA" function is selected, the device generates a current of 20 mA: measure the current emitted by the 4-20 mA output using a multimeter and enter the value given by the multimeter in the function “AC1.20mA” or “AC2.20mA”.

9.12.4 Calibrating the sensor

DANGER

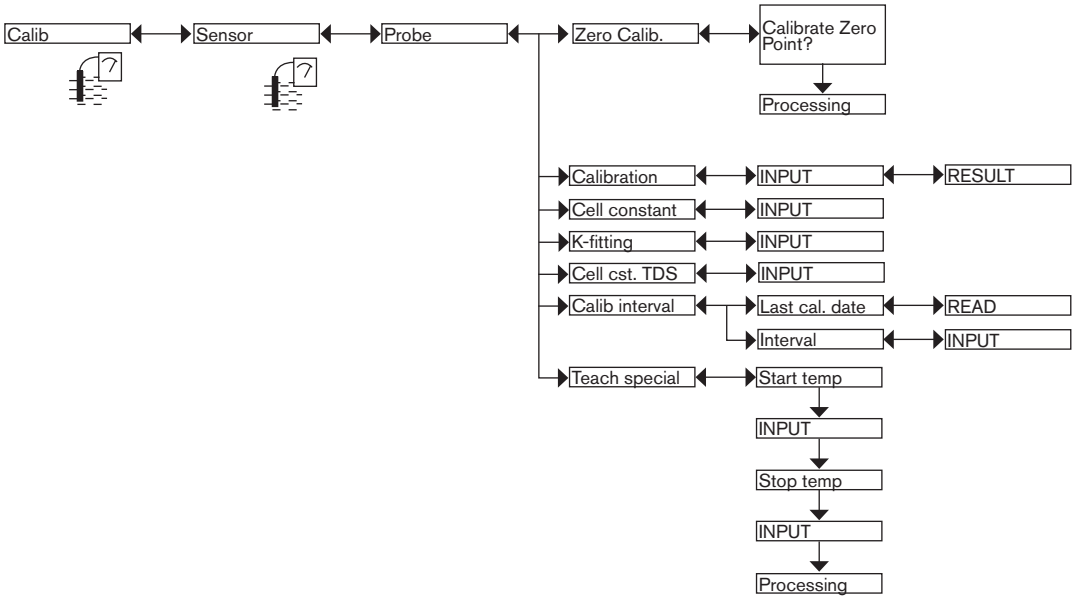
Risk of injury due to electrical voltage.

- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to the nature of the fluid.

- Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

See chap. "9.9" to access the Calibration menu.



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The accuracy of the conductivity measurements is influenced by:

- the drift of the zero point of conductivity. Correct the drift of the zero point with the function *ZERO CALIB*. To be done if the conductivity of the air measured by the conductivity sensor is higher than 10 µS/cm. See details p. 56.
- the conductivity cell constant:
  - determine the cell constant of the sensor used with the function CALIBRATION (this calibration updates the last calibration date in the “Last cal. date” function of the CALIB INTERVAL sub-menu hereafter). See details p. 56,
  - or enter the cell constant (marked on the calibration certificate of the device) in the function CELL CONSTANT. The entering of the cell constant does not update the last calibration date in the “Last cal. date” function of the CALIB INTERVAL sub-menu. The function CELL CONSTANT makes it also possible to read the value of the constant which has been determined with the function CALIBRATION.
- the correction factor of the fitting. Enter the correction factor related to the fitting S020 used in the function *K-FITTING*. The correction factor depends on the shape, the material and the diameter of the fitting used. The following table gives the correction factors of the fittings S020.

Tab. 1: Correction factors of the fittings S020, depending on the shape, the material and the DN of the fittings

DN	Fittings with true union connections or fittings with weld ends			Fittings with internal or external thread connections or fittings with weld end connections		Measurement chamber	Welding sockets or fusion spigots		
	PVDF	PP	PVC	Brass	Stainless steel		Stainless steel	PVDF	PP
<32	1,08	1,08	1,08	0,99	0,99	-	-	-	-
32	1,08	1,08	1,08	0,99	0,99	0,99	-	-	-
40	1,04	1,04	1,04	0,99	0,99	0,99	-	-	-
50	1,02	1,02	1,02	0,99	0,99	0,99	0,99	-	-
65	-	-	-	-	-	-	0,99	1,02	1,02
80	-	-	-	-	-	-	0,99	1,02	1,02
100	-	-	-	-	-	-	1,00	1,02	1,02
>100	-	-	-	-	-	-	1,00	1,00	1,00

CELL CST TDS: enter the TDS factor suited to your process. The TDS factor allows for calculating the amount of Total Dissolved Solids (TDS), in ppm, depending on the measured conductivity. The default TDS factor is 0,46 (NaCl)

CALIB INTERVAL: read the date of the last calibration (function “Last cal. date”) and set the periodicity of calibrations, in days (function “Interval”): the device generates a “maintenance” event by displaying the icon and a “warning” message, each time a calibration is due. Set function “Interval” to “0000 days” to ignore the function.

- The "warning" message may be associated with one or other or both transistor outputs (see chap. "9.11.10").
- See also "Solving a problem" at chap. "10.3".

TEACH SPECIAL: define the temperature compensation curve specific to your process. The curve thus determined and memorised is used by the device when you choose “Special” in the “Comp.” function in the menu “Param - Sensor” (see chap. "9.11.11"). See details page 58.

The compensation curve determined with the function TEACH SPECIAL cannot be transferred to another device with the function DOWNLOAD. See chap. "9.11.1".

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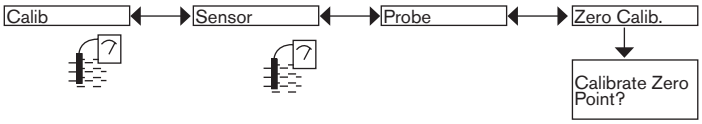
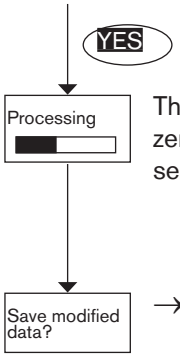
Calibrate the zero point of conductivity (function "Zero Calib." of the menu "Probe")

- In order not to interrupt the process, activate the HOLD function (see chap. "9.12.1").
- Before each calibration, fully clean the conductivity sensor with a special cleaning agent, then rince and dry.

If the value of air conductivity measured is higher than 10 µS/cm, readjust the device, holding the sensor in the air (zero point of conductivity of the device).



→ Put the cleaned and dried conductivity sensor in contact with the ambient air.



The device automatically calibrates the zero point of conductivity in less than 1 second.

→ Save or not the calibration result by choosing "Yes" or "No".

Calibrate the conductivity sensor ("Calibration" function in the "Probe" menu)

Calibration consists in determining the C constant specific to each conductivity sensor using a solution with a known conductivity.

- In order not to interrupt the process, activate the HOLD function (see chap. "9.12.1").
- Before each calibration, fully clean the conductivity sensor with a special cleaning agent.
- To calibrate a conductivity sensor off-line, put the sensor in the center of a beaker of min. 8 cm in diameter.
- To calibrate a conductivity sensor off-line, make sure there are no air bubbles in the hole of the conductivity sensor.
- Set the periodicity of calibrations in the "Interval" function in the sub-menu "Calib interval" (see previous page): each time a calibration is due, the device generates a "maintenance" event and a "warning" event.

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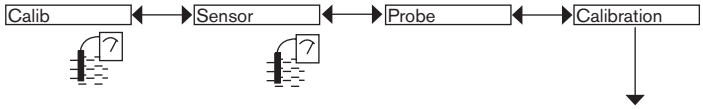
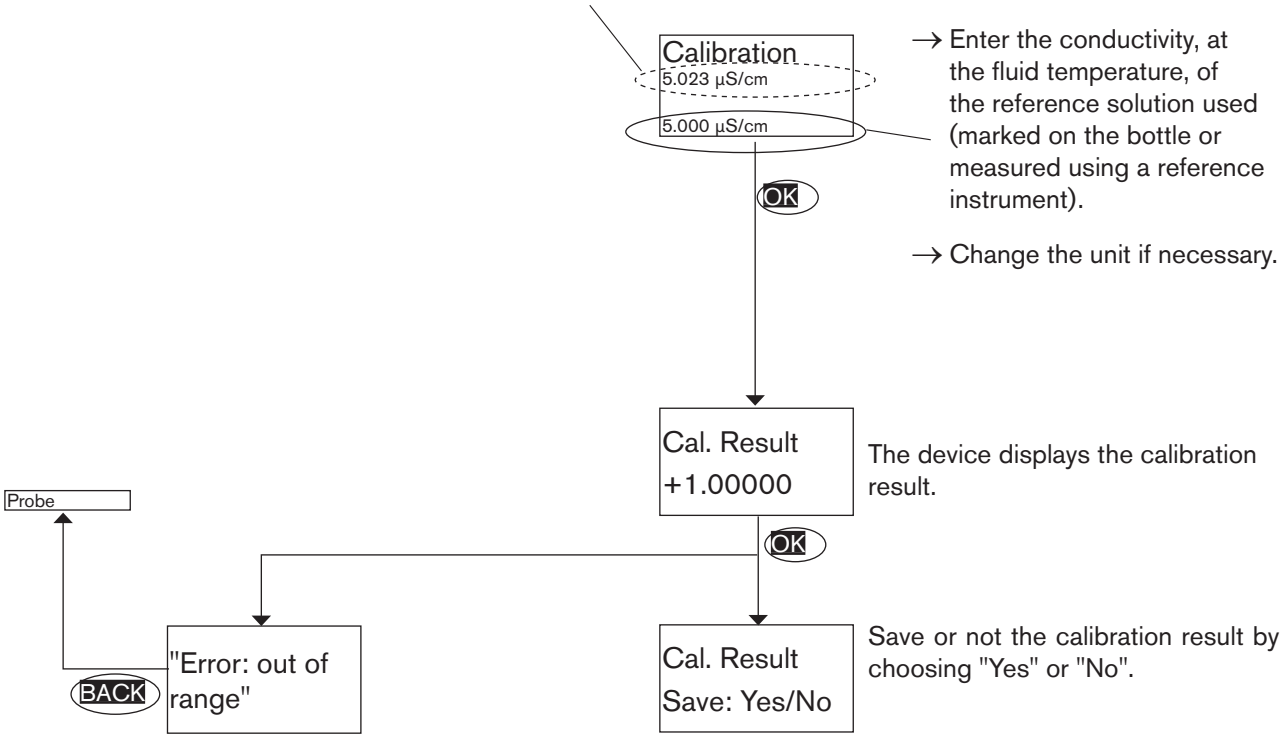


→ Immerse the clean conductivity sensor in the solution with a known conductivity. The device alternately displays:

- the measured conductivity of the solution
- the measured temperature of the solution



The message "Error: out of range" signals that the cell constant is out of the authorized range (< 0,8 or > 12); This may be due to:

- either a mistake made when entering the conductivity,
- or when there are air bubbles in the hole of the conductivity sensor
- or when the minimum distance of 4 cm between the conductivity sensor and the sides of the beaker is not observed.

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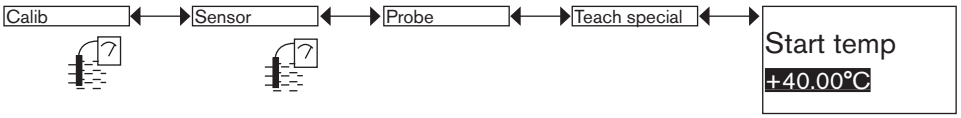
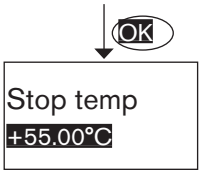
Define the temperature compensation curve specific to your process (“Teach special” function in the”Probe” menu)



→ Enter the value for the start of the temperature range for which the compensation curve must be determined.



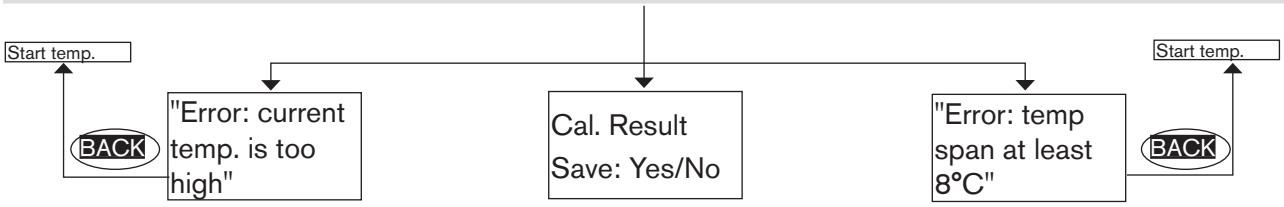
The fluid temperature range (T-; T+) must be entered in such a way that the difference between T- and T+ is greater than 8 °C. The message "Error: Temp span at least 8 °C" is displayed if the difference between the range start and end values is less than 8 °C.

→ Enter the value of the end of the temperature range for which the compensation curve must be determined.

→ Before confirming to begin the procedure, check that the fluid temperature is below 25 °C and T-.

When the function HOLD is deactivated (chap. "9.12.1"), the device determines the compensation curve with 10 points and alternately displays both the measured conductivity and the measured temperature of the solution.

- Immerse the sensor in the solution and progressively reheat:
  - from T- to 25 °C if T- < T+ < 25 °C
  - from T- to T+ if T- < 25 °C < T+
  - from 25 °C to T+ if 25 °C < T- < T+
- The rise in temperature must be slow because of the inertia of the temperature sensor.
- Avoid the formation of bubbles on the conductivity sensor.



The message "Error: current temp. is too high" is displayed if, at the beginning of the Teach-In procedure, the fluid temperature is higher than 25 °C or than T-.

At the end of processing, save the compensation curve or not.

The message "Error: Temp span at least 8 °C" is displayed if the difference between the range start and end values is less than 8 °C.

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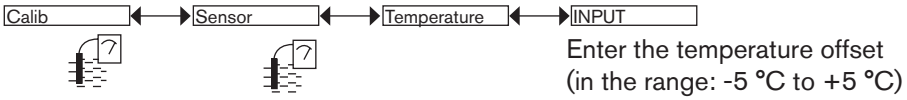
9.12.5 Entering an offset for the temperature measurement

See chap. "9.9" to access the Calibration menu.

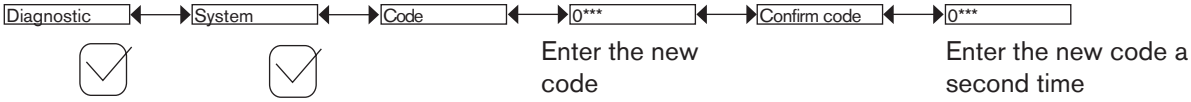
The temperature transmitted by the temperature probe may be corrected. This correction value is the temperature offset.



9.13 Knowing the Diagnostic menu

9.13.1 Modifying the Diagnostic menu access code

See chap. "9.9" to access the Diagnostic menu.



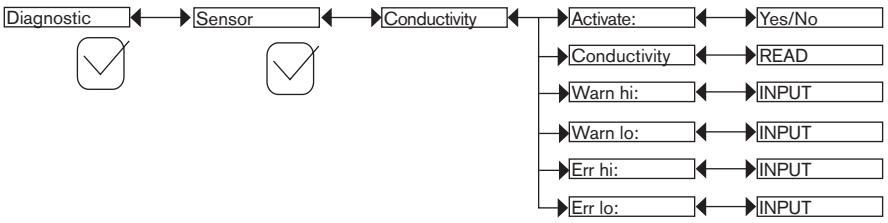
If the default code (0000) is entered, the code will not be requested to access the menu.

9.13.2 Monitoring the fluid conductivity

See chap. "9.9" to access the Diagnostic menu.

The function allows for monitoring the measured value of the fluid conductivity and for configuring the behaviour of the device if the parametered ranges are exceeded.

A malfunction in your process or the conductivity sensor may be indicated either by too low or too high a measured fluid conductivity.



To be warned when the fluid conductivity is too low or too high:

→ activate monitoring of the fluid conductivity in the function “activate”, then

→ set a conductivity range outside of which the device generates a “warning” event and displays the ☺ and ⚠ icons.

→ set a conductivity range outside of which the device generates an “error” event and displays the ☹ and ERR icons.

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When the device generates a "warning" or an "error" event:

→ go into the “Info” menu to read the cause of the event generation.

→ and/or go into the “Sensor” function of the Diagnostic menu to read the measured conductivity value.

→ if necessary, clean and/or recalibrate the conductivity sensor,

→ if necessary, check the process.

- Furthermore, the "warning" event can be associated to one or the two transistor outputs. See chap. "9.11.10", function "Output.TR1" or "Output.TR2".
- Furthermore, the "error" event can be associated to one or the two current outputs. See chap. "9.11.9", function "Output.AC1" or "Output.AC2".
- See also "Solving a problem" at chap. "10.3".

ACTIVATE: choose whether or not to activate monitoring of the fluid conductivity.

CONDUCTIVITY: read the fluid conductivity measured in real time.

WARN HI: enter the fluid conductivity value above which a “warning” event is generated.

WARN LO: enter the fluid conductivity value below which a “warning” event is generated.

ERR HI: enter the fluid conductivity value above which an “error” event is generated.

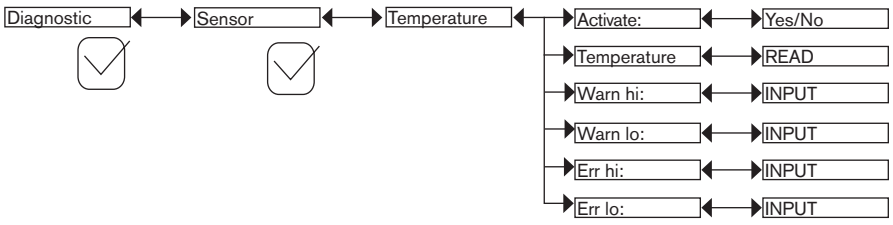
ERR LO: enter the fluid conductivity value below which an “error” event is generated.

9.13.3 Monitoring the fluid temperature

See chap. "9.9" to access the Diagnostic menu.

The function allows for monitoring the fluid temperature and configure the behaviour of the device if the parametered ranges are exceeded.

A malfunction in your process or the conductivity sensor may be indicated either by too low or too high a measured fluid temperature.



To be warned when the fluid temperature is too low or too high:

→ activate monitoring of the fluid temperature in the function “activate”, then

→ set a temperature range (in °C) outside of which the device generates a “warning” event and displays the ☹ and ⚠ icons.

→ set a temperature range (in °C) outside of which the device generates an “error” event and displays the ☹ and ERR icons.

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When the device generates a "warning" or an "error" event:

→ go into the “Info” menu to read the cause of the event generation.

→ and/or go into the “Sensor” function of the Diagnostic menu to read the measured temperature value.

→ then make sure the built-in temperature probe is working correctly by measuring a fluid with a known temperature. If the temperature probe is faulty, return the device to Bürkert.

→ if the temperature probe is not the cause of the problem, check the process.

- Furthermore, the "warning" event can be associated to one or the two transistor outputs. See chap. "9.11.10", function "Output.TR1" or "Output.TR2".
- Furthermore, the "error" event can be associated to one or the two current outputs. See chap. "9.11.9", function "Output.AC1" or "Output.AC2".
- See also "Solving a problem" at chap. "10.3".

ACTIVATE: choose whether or not to activate monitoring of the fluid temperature.

TEMPERATURE: read the fluid temperature measured in real time through the built-in temperature probe.

WARN HI: enter the fluid temperature value above which a “warning” event is generated.

WARN LO: enter the fluid temperature value below which a “warning” event is generated.

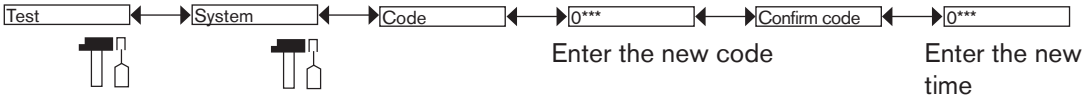
ERR HI: enter the fluid temperature value above which an “error” event is generated.

ERR LO: enter the fluid temperature value below which an „error“ event is generated.

9.14 Knowing the Test menu

9.14.1 Modifying the Test menu access code

See chap. "9.9" to access the Test menu.

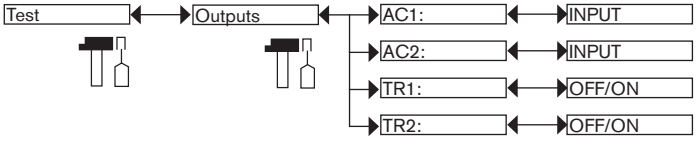


If the default code (0000) is entered, the code will not be requested to access the menu.

9.14.2 Checking the outputs functions

See chap. "9.9" to access the Test menu.

- Make sure the "Hold" mode is deactivated. See chap. "9.12.1".
- The T icon is displayed in place of the icon as soon as the check for the correct working of an output has started. During the check the related output does not react according to the measured physical value.



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AC1: check that current output 1 is working correctly by entering a current value and then selecting “OK”.

AC2: check that current output 2 is working correctly by entering a current value and then selecting “OK”.

TR1: check that transistor output 1 is working correctly by selecting the status of the transistor (“ON” or “OFF”) then “OK”.

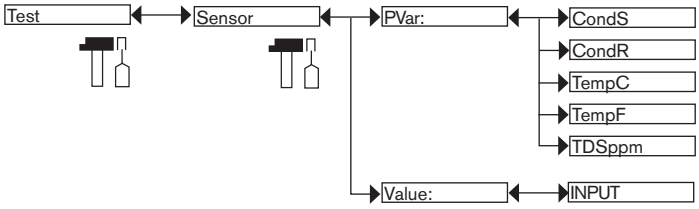
TR2: check that transistor output 2 is working correctly by selecting the status of the transistor (“ON” or “OFF”) then “OK”.

9.14.3 Checking the outputs behaviour

See chap. "9.9" to access the Test menu.

- Make sure the "Hold" mode is deactivated. See chap. "9.12.1".
- The symbol T is displayed in place of the symbol as soon as a simulation of a measurable variable has been started. During the check the outputs do not react according to the measured process variable.

The feature allows for simulating the measurement of the process value to check if the outputs are correctly configured.



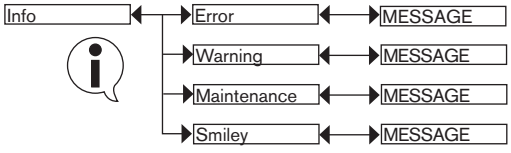
PVAR: choose the process value to be tested.

VALUE: enter a process value selected from the “PVAR” function above to check output behaviour.

9.15 Knowing the Information menu

9.15.1 Reading the cause of events linked to icons

See chap. "9.9" to access the Information menu.



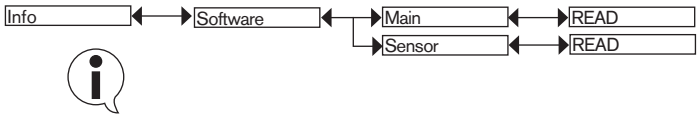
The function allows for reading a short description of the reason why the following icons are displayed by the device:

- ERROR:
- WARNING:
- MAINTENANCE:
- SMILEY: or

See also "Solving a problem" at chap. "10.3".

9.15.2 Reading the software versions

See chap. "9.9" to access the Information menu.

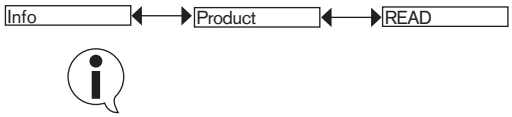


The function allows for reading:

- the software version of the acquisition / conversion board ("Main") for the measurable variables,
- the software version of the sensor ("Sensor").

9.15.3 Reading some identification informations of the device

See chap. "9.9" to access the Information menu.



The function allows for reading some of the informations that are on the name plate of the device:

- the type of the device,
- the serial number,
- the order code.

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10 MAINTENANCE AND TROUBLESHOOTING

10.1 Safety instructions

Danger due to electrical voltage.

- Shut down the electrical power source of all the conductors and isolate it before carrying out work on the system.
- All equipment connected to the 8619 shall be double insulated with respect to the mains according to the standard IEC 61010-1:2010.
- Observe all applicable accident protection and safety regulations for electrical equipment.

Risk of injury due to high pressure in the installation.

- Stop the circulation of fluid, cut off the pressure and drain the pipe before loosening the process connections.

Risk of injury due to high fluid temperatures.

- Use safety gloves to handle the device.
- Stop the circulation of fluid and drain the pipe before loosening the process connections.

Risk of injury due to the nature of the fluid.

- Respect the regulations on accident prevention and safety relating to the use of aggressive fluids.

WARNING

Risk of injury due to non-conforming maintenance.

- Maintenance must only be carried out by qualified and skilled staff with the appropriate tools.
- Ensure that the restart of the installation is controlled after any interventions.

10.2 Cleaning the device

- If magnetic particles are in the fluid to be measured, often clean the deposits on the conductivity sensor, with a special cleaning agent.
- Always use a cleaning product compatible with the materials from which the device is made.
- Activate the HOLD function (see chap. "9.12.1") in the Calibration menu in order not to interrupt the process during cleaning.
- When cleaning the sensor, do not clog the hole of the conductivity sensor.

The device can be cleaned with a cloth dampened with water or a detergent compatible with the materials the device is made of.

Please feel free to contact your Bürkert supplier for any additional information.

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10.3 Solving a problem

Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA	depending on thresholds	ERR + ☺	"Sensor not found"	The connection to the measurement module is interrupted.	→ Switch the device off and on again. → If the problem persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"S:Probe error"	Wrong conductivity measurements.	→ Switch the device off and on again. → If the problem persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"S EEprom Read" "S EEprom Write"	Factory data and data from the Calibration menu are lost. The device continues to measure but with a bad accuracy.	→ Switch the device off and on again. → If the problem persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"S Temp. Error"	The fluid temperature is not measured any more. The temperature is not compensated any more. The temperature is displayed in the Process level with "+++++°C/°F".	→ Switch the device off and on again. → If the problem persists, return the device to Bürkert.

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Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
ON	22 mA	depending on thresholds	ERR + ☺	"TR EE Fact Read"	Parameter reading error.	→ Switch the device off and on again. → If the error persists, set the device back to the default settings (chap. "9.11.4"). → If the problem persists, return the device to Bürkert.
				"TR EE User Read"		
ON	22 mA	depending on thresholds	ERR + ☺	"TR COM Measure"	The acquisition/conversion module of the process values is faulty. The process is stopped.	→ Switch the device off and on again. → If the problem persists, return the device to Bürkert.
ON	22 mA	depending on thresholds	ERR + ☺	"TR EE UserWrite"	Parameter saving error.	→ Switch the device off and on again. → Save the settings again. → If the error persists, set the device back to the default settings (chap. "9.11.4"). → If the problem persists, return the device to Bürkert.

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Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
OFF	4-20 mA	depending on thresholds	⚠ + ☺	"S RTC Reinit"	The date and time are lost because the device has not been powered up for at least 3 days.	→ Set the date and time again (see chap. "9.11.2"). → Feed the transmitter for at least 10 minutes so that the date and time are battery fed for 3 days.
ON	22 mA [1]	depending on thresholds	ERR + ☹	"E:Conductivity"	The fluid conductivity is out of range. The message is displayed if the monitoring of the fluid conductivity has been activated, depending on the set thresholds ERR LO and ERR HI (see chap. "9.13.2").	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chap. "9.13.2"). → If necessary, clean and/or recalibrate the conductivity sensor. → If necessary, check the process.
ON	22 mA [1]	depending on thresholds	ERR + ☹	"E:Temperature"	The fluid temperature is out of range. The message is displayed if the monitoring of the fluid temperature has been activated, depending on the set thresholds ERR LO and ERR HI (see chap. "9.13.3").	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chap. "9.13.3"). → If necessary, check whether the built-in temperaure probe is working correctly by measuring a fluid with a known temperature. → If the temperature probe is faulty, return the device to Bürkert. → If the temperature probe is not the cause of the problem, check the process.

[1] if the MODE DIAG. function of the "Output.AC1" or "Output.AC2" menu is set to "22 mA" (see chap. "9.11.9"); else, the current output delivers a standard current between 4 and 20 mA

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Red LED	Current output	Transistor output	Icon	Message displayed in the Info menu	Possible cause	Recommended action
OFF	4-20 mA	Switched [2]	⚠ +	"W:Conductivity"	The fluid conductivity is out of range. The message is displayed if the monitoring of the fluid conductivity has been activated, depending on the set thresholds WARN LO and WARN HI (see chap. "9.13.2").	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chap. "9.13.2"). → If necessary, clean and/or recalibrate the conductivity sensor. → If necessary, check the process.
OFF	4-20 mA	Switched [2]	⚠ +	"W:Temperature"	The fluid temperature is out of range. The message is displayed if the monitoring of the fluid temperature has been activated, depending on the set thresholds WARN LO and WARN HI (see chap. "9.13.3").	→ Go into the "Sensor" function of the Diagnostic menu to read the measured fluid temperature (chap. "9.13.3"). → If necessary, check whether the built-in temperaure probe is working correctly by measuring a fluid with a known temperature. → If the temperature probe is faulty, return the device to Bürkert. → If the temperature probe is not the cause of the problem, check the process.
OFF	4-20 mA	Switched [2]		"M:Calib. Date"	A calibration of the conductivity sensor is due. The periodicity of the calibrations is set within the "INTERVAL" function of the "CALIB INTERVAL" menu (see chap. "9.12.4").	→ Calibrate the conductivity sensor (chap. "9.12.4").

[2] If the “PVAR” function of the “Output.TR1” and/or “Output.TR2” menus is set to “warning” (see chap. "9.11.10"); else, the transistor outputs are operating depending on the set thresholds.

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11 ACCESSORIES

CAUTION

Risk of injury and/or damage caused by the use of unsuitable parts.

Incorrect accessories may cause injuries and damage the device and the surrounding area.

- Use only original accessories and original replacement parts from Bürkert.

Accessory	Order code
Display module	559168
Black blank cover with EPDM seal	560948
Transparent cover with EPDM seal	561843
Calibration solution, 300 ml, 706 µS/cm	440018
Calibration solution, 300 ml, 1413 µS/cm	440019
Calibration solution, 500 ml, 12880 µS/cm	565741
Calibration solution, 300 ml, 100 mS/cm	440020
5-pin female M12 connector, to be wired	917116
5-pin female M12 female connector, moulded on shielded cable (2 m)	438680
5-pin male M12 connector, to be wired	560946
5-pin male M12 connector, moulded on shielded cable (2 m)	559177

12 PACKAGING, TRANSPORT

NOTE

Damage due to transport

Transport may damage an insufficiently protected device.

- Transport the device in shock-resistant packaging and away from humidity and dirt.
- Do not expose the device to temperatures that may exceed the admissible storage temperature range.
- Protect the electrical interfaces using protective plugs.

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13 STORAGE

NOTE

Poor storage can damage the device.

- Store the device in a dry place away from dust.
- Storage temperature of the device: -10 to +60 °C.

14 DISPOSAL OF THE PRODUCT

NOTE

Damage to the environment due to parts contaminated by the fluid.

- Dispose of the device and its packaging in an environmentally-friendly way.
- Comply with the regulations which concern the area of waste disposal.

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